JAMAICA.

# ANNUAL REPORT

OF THE

# DEPARTMENT OF AGRICULTURE

FOR

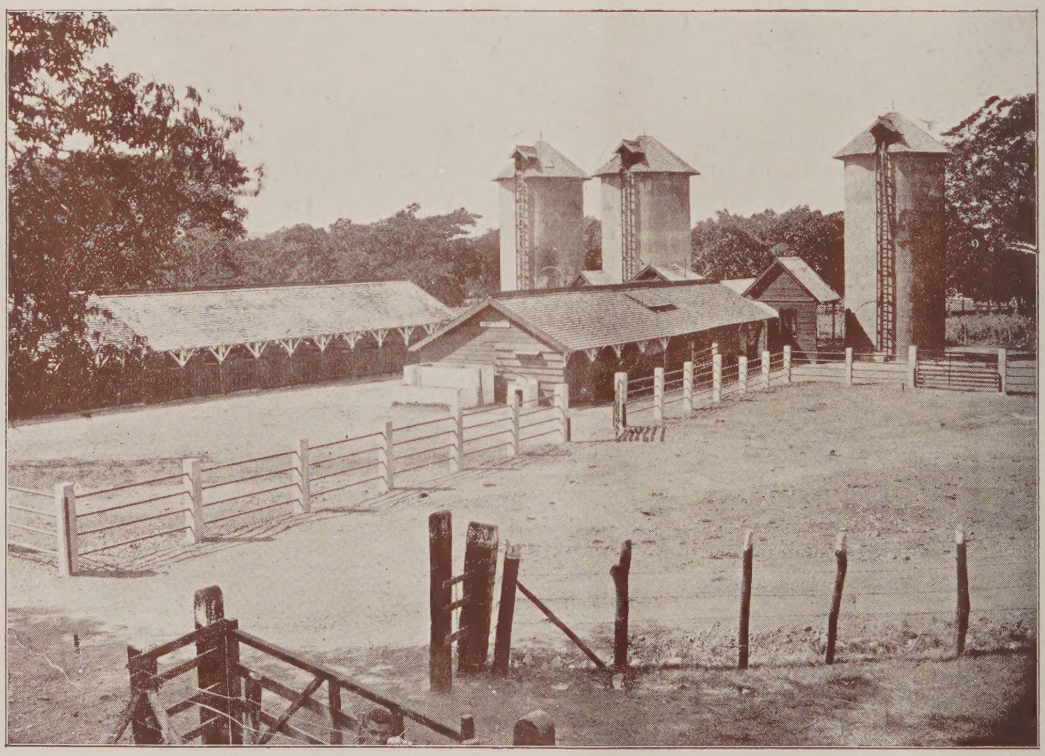
# THE YEAR ENDED 31ST DECEMBER, 1927.

*Ordered by His Excellency the Governor to be Printed.*

JAMAICA
GOVERNMENT PRINTING OFFICE, KINGSTON.

1928.

*Pedigree Cattle, Hope Farm.*



*Farm Yard, Hope.*

[*Frontispiece.*

# DEPARTMENT OF SCIENCE AND AGRICULTURE.

REPORT FOR THE YEAR ENDED 31ST DECEMBER, 1927.

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Office of the Director, Hope, Kingston,

February, 1928.

Sir,

I have the honour to submit for the information of His Excellency the Governor, the Report of the Department of Science and Agriculture for the year 1927.

## I.—GENERAL OBSERVATIONS.

Although the Island rainfall for 1927 was 4 inches below normal, the distribution was again favourable for agricultural production and the year 1927 must be classed among the 'good years' in the records of the Colony's progress.

The agricultural prospects for the major crops to be reaped in 1928 are also favourable and the turn of the tide which took place in 1926 and was continued in the following year is now in prospect of consolidation so as to constitute a definite period of agricultural progress and prosperity of island-wide dimensions.

The outstanding fact of 1927 was the exportation of 21,074,612 stems of *Bananas*, an increase of over 3 million stems over the previous record of 1926.

But for the autumnal gales which destroyed 2 million stems of fruit the Banana crop of 1927 would have passed the 23 million mark. For the coming year, allowing for some setbacks due to drought in certain areas, the estimated crop of Bananas may be set at 23 million stems—with favourable seasons and a brisk trade this estimate may easily be passed for the number of Banana plants growing in Jamaica at this moment is greater than ever before in the history of this industry.

The fight against Panama Disease has continued. With our increased staff of 18 Inspectors, it has been possible to supervise the chief Banana areas. The records show that 40,000 diseased plants were dealt with during the year.

The parish of Portland continues to supply over 70 per cent. of cases of this disease. Encouragement has followed the commercial cultivation of the immune "Robusta" Banana on clay lands in St. Mary infected with Panama Disease. From one estate, the fruit from 5 acres of "Robusta" Bananas was successfully shipped and sold.

The Banana Breeding Experiments are now approaching a very interesting stage. The first experiments were made by crossing *Musa Kewensis* (a seeding, non-edible species with good conformation of bunch and fingers) with various edible Bananas. These hybrids have grown slowly and appear to require from 3 to 4 years to attain the fruiting stage. On the other hand, a number of hybrids between edible species have grown so quickly that fruit may be expected in 2½ years from sowing the seed. The variations in seedlings from the same cross are marked and it is hoped that continuous efforts in the raising of cross-fertilised Banana seedlings will afford us the immune commercial Banana required to solve the problem of Panama Disease.

Next year it will be necessary to obtain a Banana Breeding Station, preferably in St. Catherine, at which the new Bananas can be tested under commercial conditions and any promising varieties propagated for distribution to planters. The following "Immune" Bananas are now under trial: China, Robusta, Bumelan, Lacatan.

The exports of *Coffee* show an increase of over 2½ million pounds in weight. The Jamaica Agricultural Society and the Department continued the work of issuing coffee plants whereby 59,000 plants were sold to the public at one shilling per hundred—the estimated cost of production of the seedlings. The best Blue Mountain Coffee Seed is used at the Hope nurseries for this purpose. A large issue for the coming year has been provided for. The effect of the new Produce Protection Law has been quite marked in the case of small settlers' coffee which had previously been badly prepared and greatly deteriorated through the absence of proper and necessary equipment for the production of good commercial coffee. Co-operative selling of small settlers' coffee has been tried with success. This should lead to a great improvement in the coffee trade of the Colony which is now chiefly in the hands of small growers.

*Cacao* shows a small reduction on last year's record of 3,000 tons. Here, again, the Produce Protection Law with its drastic provisions has forced a number of Chinese buyers of Cacao to erect reasonable apparatus for curing and drying the cacao which they buy from small producers. Commercial firms report that a marked improvenent in Jamaica "ordinary" cacao has recently taken place.

*Coconuts.*—A record for our coconut industry was created in 1927 by the export of over 32 million nuts and copra to a total equivalent of 55,730,000 nuts as against an equivalent of 51,439,000 nuts in 1926 which constituted the previous record for coconuts from Jamaica.

By the passing of a protective duty on imported Cottonseed and bean oils the Legislative Council at its Autumn Session sought to inaugurate a local industry in the production of edible coconut oil. The Government Laboratory is carrying out experiments, at the special instance of His Excellency the Governor who is greatly interested in developing the coconut industry, to test the simplest methods of (a) deodorising (b) removing rancidity from native coconut oils. The results so far obtained are most encouraging. By removing free-fatty acids with soda and then blowing super-heated steam through the treated oil in vacuo, a thoroughly satisfactory deodorised oil was produced which was found to be quite suitable for replacing the imported cooking oils.

It is anticipated that a larger quantity of coconuts will be utilised in the Colony for this purpose thus reducing the amount of £30,000 per annum paid for foreign oils used for cooking. The reaction of this home industry on the coconut trade is likely to be beneficial. There are times and seasons when nuts are in excess of the demands of the exporters and there are also dull periods when the Copra trade sinks to a low standard. This outlet for coconuts in the local market is calculated to stabilise the coconut trade and to place producers in a more favourable position for selling their crops.

The value of the coconut cake or "poonac" for feeding dairy cows is also calculated to assist the young but growing dairy industry of the Colony.

The health of the coconut groves remains excellent and a marked recovery has been made by the plantations at the eastern end of the Colony which were damaged by the hurricane of 1917.

*Sugar* continues to improve and the exports for 1927 stood at just over 50,000 tons valued at £800,000. An even larger crop may be expected this year, for the favourable seasons combined with a higher standard of tillage on the larger areas of sugar cane have produced the highest tonnage of canes grown in Jamaica for the past half century. The substitution of some of the new canes introduced by the Department for the standard estate cane has greatly improved the yield of sugar on many fields and a rapid extension of new canes is now taking place.

At Hope, a 10 acre field of "Uba" canes which was left completely alone and uncultivated after reaping the crop in 1926 gave a yield of 600 tons or an average of about 60 tons fodder-cane per acre.

The problem of *Rum* remains one of grave difficulty. Estates are seeking to reduce the production of rum by every means and some are even using molasses as manure for the cane-fields, a proceeding hitherto unknown in this Colony which had always been able to find a profitable use for molasses in the manufacture of rum. Some new canes resistant to Mosaic Disease are of great promise and the best of these are being propagated at Hope for issue to planters next season.

A summary of 25 years' experiments with fertilisers for sugar cane on estates in Jamaica has been included in a later section of this report for the guidance of planters who desire to obtain a greater yield of canes per acre by a judicious use of commercial fertilisers.

The *Fibre* industry has received encouragement by the fiscal protection for locally made Sisal rope which was effected by the Legislature at its Autumn Session. The Government Sisal Plantation and Factory at Lititz has been leased and is now to be operated by the lessee.

*Ginger* yielded a good crop slightly below that of 1926.

*Citrus* suffered a decline of 50 per cent. in the export of oranges. Grapefruit, however, shows an increase of 4,000 boxes and now stands at 80,000 boxes approximately. The Department continued to supply Grapefruit plants on a large scale, a total of 96,000 plants having been issued in 1926 and 1927.

In addition to our Blue Mountain Seedling Grapefruit which has been found to come true to type and to be a very fine fruit, arrangements have been made to issue 3,000 budded grapefruits in 1928 from the Hope nursery.

The loss in trade from Oranges was offset by an increase in Orange Oil from 64,000 to 88,000 lbs. Under present conditions of transport and trade it would appear that Jamaica is more likely to secure a good trade for Grapefruit with Canada and England than for Oranges.

In a few years the large plantings of grapefruit recently established should have an effect on the available supply of grapefruit for export.

*Honey* due to a more favourable year, increased from 124,000 to 156,000 gallons (approximately). The Foul-brood epidemic in Kingston and St. Andrew was successfully dealt with by burning all infected hives and a system of frequent inspection of all apiaries in the declared area. For the past seven months no new cases have been found and it is now proposed to revoke the Order. It is important for bee-keepers to remember, however, that the Law imposes the duty of reporting to the Department on every owner of bees who finds or suspects or has reasonable grounds for suspecting any dangerous disease among his bees.

*Logwood.*—A modest recovery has taken place but the exports of wood show a reduction on those for the previous year. A good deal of logwood has recently been cut and chipped at the west end of the Island and there would appear to be some recovery in the trade in this dyewood.

*Tobacco* again shows a drop in the export of cigars. The Jamaica Agricultural Society is carrying on a system of nurseries and prizes to encourage the tobacco industry among small growers in St. Elizabeth and other places. The duty on imported cigarettes having been raised there is now a greater encouragement to the local producers of native cigarettes.

*Animal Diseases.*—No cases of Anthrax or Foot and Mouth Disease occurred in 1927.

*Livestock.*—The Legislature having decided to reduce the area of "Grove Place" in Manchester from 3,000 to 1,000 acres by sale of 2,000 acres for purposes of land settlement, the herd was reduced from 450 to approximately 200 head which is now regarded as a convenient number to utilise the pastures associated with the public Stud Farm at this centre.

The sum of £2,397 was realised from the sale of cattle at "Grove Place" and paid to the credit of General Revenue.

The Hope Farm had a very successful year and substantial improvements were effected out of current revenue. A battery of three monolithic silos, each of 220 tons capacity, has now been completed and filled with guinea corn silage so as to store food for the herd for at least six months. A new clipping equipment by Messrs. R. A. Lister, England, with four machines worked by an oil-engine has been found of great service for clipping dairy cows, young stock and the working mules. It has been found possible to clip 40 head in a working day with this installation. The butter room has also been enlarged and equipped with an engine and power-churn. A sanitary calf shed for 60 heifers in steel stanchions with concrete mangers and floor has been a valuable addition to our equipment. The "bottom yard" has been paved with the stones of the old "Hope Tavern" set in concrete and has been fitted with 46 stanchions concrete mangers and individual watering bowls. A large sanitary dairy building, 120′ by 30′, with 60 stanchions and individual water-bowls for the cows has been erected in the Mango Walk and is locally known as "The Cathedral."

This building will be equipped with electric light to facilitate milking before daylight in the winter months.

The average milk yield of the herd has been increased by 45 per cent. since 1922 by selection and breeding.

The Hope Farm which had been worked on an open account at the Treasury for 16 years closed out its career with a surplus.

## Agricultural Education.

The Farm School at Hope has been enlarged and improved in many ways and is now in a flourishing condition with 54 students in residence. There were 52 applications for the 24 vacancies to be filled at the end of December. Since its inauguration 18 years ago, 262 students have passed through this Institution, the majority of whom are engaged in agricultural work. Our thanks are due to the Government and the Legislative Council for their support of this Institution and the provision of the necessary funds to place it on an improved basis of equipment and sanitation.

## The Government Stock Farm, Hope.

When the Farm School was started 18 years ago the lands available for practical farming were only about 50 acres in extent and the live stock at the start consisted of 5 horses, 3 donkeys, 15 cattle, 2 pigs, 4 sheep. In the following year, the old Hope lands of approximately 1,600 acres in extent were leased at a rental of £200 per annum for the extension of the operations of the Farm School. These lands were purchased by Government for £5,423 in 1914 and have been placed free of rent at the disposal of the Agricultural Department for the development of a Government Stock Farm to be operated in conjunction with the Farm School. Although no rent has been paid, large sums have been expended by the Farm in the development of the Estate which is now valued in the region of £28,000.

From the start the Farm was operated by special permission of the Secretary of State on a Working Account at the Treasury. After 16 years the account was transferred to a Bank in April 1st, 1926, with a credit of £640. From the audited accounts submitted to the Legislature the following facts have been taken. Government grants for the importation of Live Stock were made by votes on the Estimates for 1909-1914 to a total cost of £2,343.

From time to time the Hope Farm is repaying this sum by assisting the Stud Farm in Manchester by replacing sires. It is thus estimated that the Hope Farm will be able to keep the Stud at Grove Place supplied with fresh blood for the next 20 years without asking for money from General Revenue.

On the 31st March, 1926, inventories of Assets and Liabilities were taken which showed the total Assets to be £11,126 5s. 0½d. and the total Liabilities to be £2,021 9s. 3d., thus showing an excess of Assets to the amount of £9,104 15s. 9½d.

For the year ending 31st March, 1927, a net profit of £353 13s. 5½d. was made which now brings the total excess Assets (or net profits) to £9,458 9s. 3d.

These figures are shown in the Audited Accounts as presented to the Legislative Council.

For 1927-8 the net profit is expected to be £1,500.

The Livestock were valued in December by an outside Valuator of great experience, Mr. E. W. Muirhead, and amounted to £8,378, showing a gain of £378 over the value for the previous year.

The Dairy Herd has been continuously bred and selected for production.

Since 1922 the average yield per cow per diem has been raised by 45 per cent. The record of milk production for the West Indies is held by the Hope cow " Norbrook 2nd" with a yield of 14,877 lbs. milk in one year, selling for £191 at 8d. per quart.

As an investment of Public Money the Hope Farm indicates a gain of over £30,000 to the Government while it has exercised a very considerable influence on the dairy stock of the Colony by the distribution to island breeders to date of exactly 400 bulls specially selected for the production of improved dairy cattle in Jamaica.

## II.—PUBLIC GARDENS.

*Report of the Superintendent and Horticulturist.*

### I. Hope Gardens.

The collection of orchids was added to by a further importation of 100 plants comprising Cattleya, Laelio Cattleya, Sophro-Laelio Cattleya and Brasso Cattleya hybrids. There was a continuous show of bloom throughout the year. A start has been made to produce orchid seedlings of known parentage and a number of successful crossings have been obtained. Seeds have been sown on prepared compost and on a media in test tubes, but at the present time it is too early to state what measure of success is likely to be obtained.

We were presented with fourteen choice varieties of Hippeastrums by the Kew Gardens for the purpose of improving our seedling varieties.

The raising of cross fertilised Bougainvillea Seedlings has continued. The results so far, are as follows:—

1924. Var. " Lady Wilson" (Pink), B. Rosa Catalina X B. Brick-red; 1926. Var. " Evelyn Jelf" (Adrianople Red), B. Rosa Catalina X B. Brick-red.; 1927. Var. " Apple Blossom" (Pale Rose), B. Rosa Catalina X B. Ruby.

All the seedlings obtained by crossing these hybrids have so far reverted to the common purple.

As in previous years, a large number of Rose plants were imported from America for sale to supply the public demand.

We obtained from the Botanic Gardens, Trinidad, a collection of Hibiscus cuttings which should add to our collections of varieties. We also obtained cuttings of seedling Hibiscus from the Mayaguez Experiment Station, Porto Rico.

A collection of Japanese Gold Fish including Fantails, Comets and Shubunkins was imported from the Independent Nurseries, America.

The demand for grapefruit and coffee plants was so large during 1926, that it was decided to grow a large number again this year, but the demand was far in excess of the supply, thus showing how this undertaking was appreciated by the public.

Mr. A. P. Hanson, Agricultural Instructor for St. Andrew, again carried through his campaign of re-afforestation in the Port Royal Mountains and distributed 2,156 plants.

#### Plants Distributed from Hope Gardens, 1927.

*Sold.*

| | |
|---|---|
| Economic Plants:— | |
| Coffee .. .. .. | 54,096 |
| Cacao .. .. .. | 739 |
| Citrus .. .. .. | 42,621 |
| Nutmeg .. .. .. | 200 |
| Eucalyptus .. .. .. | 37 |
| Miscellaneous Fruits and Economic Plants .. | 1,856 |
| | 99,549 |
| Ornamental Plants .. .. .. | 22,588 |
| | 122,137 |

*Free Grants.*

| | |
|---|---|
| Economic Plants— | |
| Coffee .. .. .. | 4,812 |
| Cacao .. .. .. | 114 |
| Citrus .. .. .. | 1,851 |
| Nutmeg .. .. .. | 3 |
| Eucalyptus .. .. .. | .. |
| Cane Tops and Cuttings .. .. | 191,960 |
| Elephant Grass Cuttings .. .. | 17,300 |
| Miscellaneous Fruits and Economic Plants .. | 8,575 |
| | 224,615 |
| Ornamental Plants .. .. .. | 4,486 |
| | 229,101 |
| Total number of Economic Plants .. .. | 324,164 |
| Total number of Ornamental Plants .. .. | 27,074 |
| | 351,238 |

The following statement shows the distribution of plants for the last three years from the Nursery at Hope:—

| | 1927. | 1926. | 1925. |
|---|---|---|---|
| Coffee .. .. .. | 58,908 | 96,228 | .. |
| Cacao .. .. .. | 853 | 223 | 508 |
| Citrus .. .. .. | 44,472 | 51,607 | 3,889 |
| Nutmeg .. .. .. | 203 | 611 | 276 |
| Eucalyptus .. .. .. | 37 | 308 | 158 |
| Cane Tops and Cuttings .. .. | 191,960 | 156,194 | 199,102 |
| Elephant Grass Cuttings .. .. | 17,300 | 67,989 | 127,950 |
| Miscellaneous Fruits and Economic Plants including Timber Trees .. .. | 10,431 | 8,593 | 9,646 |
| Ornamental Plants .. .. .. | 27,074 | 29,967 | 29,897 |
| | 351,238 | 411,720 | 371,426 |

## 2. Castleton Gardens.

If one may judge by the increasing number of visitors to Castleton Gardens on week-ends and Public Holidays, it is evident that these Gardens are fully appreciated by residents of the Island.

An extension was made to the ornamental borders by planting out the plot of land adjoining the nursery with ornamental and flowering shrubs.

Further accommodation was provided by the Jamaica Tourist Development Board by the erecting of a Tea House in proximity to the Tourist House.

During the heavy flood rains in November, the walks through the Gardens were damaged and had to be repaired with material from the Wag Water River.

The Magosteen trees bore a heavy crop of fruit this year.

### Plants Distributed from Castleton Gardens.

*Sold.*

| | |
|---|---|
| Economic Plants .. .. .. | 381 |
| Ornamental Plants .. .. | 987 |
| | 1,368 |

*Transferred to Hope.*

| | |
|---|---|
| Economic Plants .. .. .. | 3,853 |
| Ornamental Plants .. .. | 18,553 |
| | 22,406 |
| Total number of Economic Plants .. .. | 4,234 |
| Total number of Ornamental Plants .. | 19,540 |
| Total number of Plants distributed .. .. | 23,774 |

## 3. Public Gardens, Kingston.

During the year under review, the garden operations were carried through very satisfactorily by the Foreman in charge.

The lawns were much improved in consequence of the extended rainy season during the latter part of the year. Sections of the lawns where the grass had died out were replanted with Bahama grass. With the extended lawn-spaces now maintained, a much improved appearance has been given to the Gardens.

The long border to the north of the Garden which for many years had a very unattractive appearance was cleared and laid out as a lawn in which several round beds were prepared and planted with Cannas and Bougainvillea.

Cannas in many varieties kept up a constant show of bloom while along the boundaries, groupings of Bougainvilleas gave the Gardens a gay appearance during the Tourist season.

The Garden benches were all repaired and painted by the Kingston and St. Andrew Corporation.

An attractive feature which is very much appreciated and enjoyed by the Public is the Band Concerts rendered every alternate Wednesday afternoon and evening by the Jamaica Military Band.

The lawns near the Public Buildings were maintained by the staff of the Parade Gardens.

The Memorial Square received constant attention by the watering and mowing of the lawns.

### 4. Hill Gardens, Cinchona.

The usual operations were attended to and the Garden maintained in a fairly satisfactory condition.

Three plants of the Pecan Nut have been planted in the lower nursery.

Large quantities of peat and moss were supplied from the lands around the Gardens to meet the requirements of the public.

There was a greater demand for Xmas trees this year than in past years.

### 5. King's House Gardens.

During the visit of their Royal Highnesses the Duke and Duchess of York to the Island in January, the Department was called upon to carry through the decorations for the various functions.

The borders on both sides of the main drive were severely pruned before the rainy season. The rains following soon set up active growth and before many weeks had passed the shrubs had developed new growth and flowered more profusely than for many years. The triangular bed at the private entrance to the grounds on the main drive was cleared of miscellaneous shrubs reformed and planted with Cannas.

The east and west pastures were cleaned as far as funds would allow. It remains a difficult proposition to keep weeds in the pasture lands under control while the lands are not being used for pasturing animals.

One of the tennis courts which had become worn from continual use was dug up, pulverised, levelled and replanted with Bahama grass.

The extensive lawns around the Governor's residence were regularly mown and a neat appearance was always maintained.

### 6. Gordon Town Garden.

This small garden situated in the centre of Gordon Town was maintained in a tidy condition by a gardener sent fortnightly from Hope Gardens.

### 7. Bath Garden and Nursery (St. Thomas).

Mr. R. Glen Campbell, Inspector of Plant Diseases who is in charge of this garden, reports as follows:

During 1927 a new walk was laid out and several beds were re-modelled and planted out in Cannas. The usual routine work was carried out and the Garden was always kept in a tidy condition.

There was a large number of visitors to the Gardens this year including His Excellency the Governor Sir Reginald E. Stubbs and party, during their visit to the town of Bath.

The following plants were distributed during the year:—

| | |
|---|---|
| Cane Cuttings .. .. .. | 5,215 |
| Coffee Seedlings .. .. | 950 |
| Sour Orange Seedlings .. .. | 950 |
| Grapefruit Seedlings ... ... | 600 |
| Total ... ... ... | 7,715 |

### 8. Summary of Plants Distributed by the Department during last three Years.

| | 1927. | 1926. | 1925. |
|---|---|---|---|
| Coffee ... .. | 59,858 | 96,228 | .. |
| Cacao ... .. | 853 | 223 | 1,308 |
| Citrus .. ... | 46,022 | 51,607 | 3,889 |
| Nutmeg .. ... | 203 | 611 | 616 |
| Eucalyptus .. ... | 37 | 308 | 158 |
| Cane Tops and Cuttings ... | 195,175 | 161,020 | 438,102 |
| Elephant Grass Cuttings ... | 17,300 | 67,989 | 127,950 |
| Miscellaneous Fruit and Economic Plants including Timber Trees | 10,812 | 8,960 | 9,884 |
| Ornamental Plants ... ... | 28,061 | 30,885 | 31,365 |
| | 360,321 | 417,831 | 613,272 |

*Orchid Walk, Hope.*

[*Facing p. 6.*

*Water Garden, Hope.*

9. The Garden and Plantation Sales for the past three years have been as follows:—

| | £ | s. | d. |
|---|---|---|---|
| 1927 .. .. | 828 | 6 | 10 |
| 1926 .. .. | 698 | 6 | 11 |
| 1925 .. .. | 722 | 13 | 2 |

10. The Rainfall at the various Gardens for the year under review is as follows:—

| 1927. | Hope Gardens. | Hill Gardens. | Parade Gardens Kingston. | Castleton Gardens. | King's House Gds. |
|---|---|---|---|---|---|
| | Ins. | Ins. | Ins. | Ins. | Ins. |
| January .. | 2.38 | 15.67 | 0.87 | 21.74 | 0.90 |
| February .. | 2.49 | 5.88 | 0.70 | 8.05 | 1.40 |
| March .. | 1.46 | 0.61 | 0.00 | 2.85 | 0.25 |
| April .. | 3.39 | 8.81 | 1.77 | 7.55 | 3.56 |
| May .. | 4.28 | 5.40 | 1.80 | 8.73 | 4.56 |
| June .. | 1.98 | 2.16 | 0.00 | 5.17 | 1.70 |
| July .. | 5.51 | 5.86 | 3.52 | 11.65 | 2.70 |
| August .. | 4.30 | 2.98 | 3.13 | 9.57 | 2.89 |
| September .. | 8.72 | 8.84 | 2.46 | 10.68 | 2.40 |
| October .. | 16.47 | 26.43 | 10.37 | 24.36 | 12.80 |
| November .. | 10.45 | 24.56 | 2.40 | 37.25 | 5.10 |
| December .. | 0.22 | 1.65 | 0.00 | 4.61 | 0.00 |
| | 61.65 | 108.85 | 27.02 | 152.21 | 38.26 |
| Averages ... | 52.87 | 97.09 | 29.41 | 117.21 | .. |

11. Contributions to the Gardens have been received from the following:—

*Foreign.*

U.S. Department of Agriculture.
Department of Agriculture, New Guinea.
Messrs. Vilmorin-Andrieux and Co., Paris.
Mr. Coryndon Matthews, Woodside, Salcombe, South Devon.
Plant Introduction Gardens, Summit, Canal Zone.
Department of Agriculture, Trinidad.
Conservator of Forests, Belize, British Honduras.
Agricultural Experiment Station, Honolulu, Hawaii.
Royal Botanic Gardens, Kew.
Coffee Experiment Station, Service Technique, Port-au-Prince, Haiti.
Mr. W. R. Coe, 51 Wall Street, New York.

*Local.*

F. N. Isaacs, Immigration Office, Kingston.
Miss E. M. George, Avalon, Hope Road.
Mrs. M. E. Fray, Spring Plain, Milk River.
A. F. Gear, Spanish Town.
Dr. M. Grabham, Kingston.
A. C. Williams, 73 Windward Road, Kingston.
Miss M. Jeffrey-Smith, Westwood High School, Stewart Town
A. Robertson, Jamaica Sugar Estates, Golden Grove.
Hon. Ashley Eden, Belle Vue, Gordon Town.
L. L. Carrington, Jamaica Agricultural Society.

W. S. Goodman,
Superintendent of Public Gardens.

E. Downes,
Horticulturist.

## III.—AGRICULTURAL EXPERIMENTS.

*Report of the Acting Superintendent of Agriculture.*

From December, 1926 to May, 1927, I was seconded for duty as Superintendent of Agriculture and from June, 1927, I was recalled to continue my duty as Superintendent of Public Gardens and also, in addition, to act as Superintendent of Agriculture.

*Mosaic Disease.*—It is very gratifying to report that, with a few exceptions, this disease is on the decline through the more determined efforts of the planters to eradicate the disease from the sugar-cane areas of the Island. Unfortunately there are still a few who do not take it seriously and neglect to make the continuous and determined effort they should to reduce it to a negligible quantity. There are other who believe that some of the newer varieties of cane can throw off the disease after being infected and do not rogue, but a good many of these have now realised that this is not a fact as they have had their young canes so heavily infected that they had to be ploughed out and the field replanted.

Westmoreland, which was so heavily infected a few years ago, now has only about a 1% infection owing to vigorous and continuous roguing. Kew, in Hanover, is an illustration of what can be achieved in controlling Mosaic. About three years ago this estate had a 20% infection which has now been reduced to such an extent that the management has no cause to worry about Mosaic Disease. However, a vigilant watch is still being kept and every plant that appears to be infected is rogued.

*Canes.*—Several estates which were obliged in the earlier period of the out-break of Mosaic Disease to plant Uba to assist in the control of this disease are now gradually discarding this variety and planting the better varieties such as B.H. 10 (12) and Ba. 11569. It is pleasing to hear of the large tonnage that is being obtained from these two varieties. On one estate in Vere a fifteen-acre field of Ba.11569 plant canes which has recently been reaped, averaged approximately, 70 tons of canes per acre. This variety apparently prefers a friable, loamy soil. The B.H.10 (12) has given wonderful results and is being largely planted out and will be the premier variety in the Island in a few years, if not already so considered. It ratoons well and when conditions are suitable the results, as ratoons, are equally so good as plant canes. It is pleasing to see on several estates nicely laid out nurseries of the better varieties and the care and interest that are being bestowed on them. Not many years ago it would have been hard to find a nursery of cane varieties on any estate.

The White Transparent which was the most prominent cane in the Island is being gradually superseded by the B.H 10 (12), a cane which not only here, but in other sugar-cane countries, has taken the premier place among other varieties owing to its big tonnage and high sucrose and purity. Arthur H. Rosenfeld writes about the B.H. 10 (12) as follows: " This cane is the outstanding variety in Porto Rico to-day and one of the prominent varieties of the entire sugar-producing world. It seems destined within a very few years to occupy the larger part of the cane area of the Island with the S.C.12/4 taking second place."

*Experiments.*—Manurial Experiments were laid out at the following places:—Richmond, St. Ann; Friendship, Westmoreland; Frome, Westmoreland; Blue Castle, Westmoreland; Jamaica Sugar Estates, St. Thomas. Of these only the plots at Richmond were reaped. The others, owing to drought and other reasons, were reaped by the planters as they were considered valueless. At Richmond the field was not uniform throughout and therefore the results should not be considered as conclusive. In that part of the field where it was fairly uniform the results show a marked increase in plot No. 2 which received a complete fertilizer over the no-manure plot of 9.86 tons of canes. In the plot to which lime was applied the results have been disappointing. See Table I. Plots have been laid out for the comparison between Sulph. Ammonia and Amo. Phos. These will be reaped during 1928.

An experiment was carried out at Georgia Estate, Hanover, at the request of Mr. McFarlane, to ascertain what was the difference in the Factory results between Uba and White Transparent grown in the same field and under the same conditions. These results are approximately the same that have been obtained previously. See Table II.

*Adco.*—During the beginning of the year we were visited by Mr. Auton representing Adco and it was my privilege and pleasure to conduct this gentleman around the Island taking him to the principal sugar centres. A meeting of the planters which was largely attended, was held at Falmouth. At this meeting, Mr. Auton gave an interesting and instructive lecture on making synthetic farmyard manure by converting raw materials such as cane trash, banana leaves, elephant grass, etc., with the re-agent Adco. Mr. H. Holgate, Serge Island, is carrying out experiments with synthetic farmyard manure and, so far, the results obtained are very encouraging.

W. S. Goodman,
Acting Superintendent of Agriculture.

Table I.—Manurial Experiment.

*Estate—Richmond.* *Field—Lower Laughlands.*

| Plot Description. | Amm. Sulph. | Nitrate of Soda. | Potash. | Phos-phate. | Lime. | Per Acre. Cost. | Per Acre. Tons Cane. | Increase. |
|---|---|---|---|---|---|---|---|---|
| 1. No manure .. | .. | .. | .. | .. | .. | .. | 21.96 | .. |
| 2. Complete .. | 98 | 134 | 90 | 175 | .. | 56/2 | 31.82 | 9.86 |
| 3. Nitrogen .. | 98 | 134 | .. | .. | .. | 36/5 | 27.36 | 2.54 |
| 4. No manure .. | .. | .. | .. | .. | .. | .. | 24.82 | .. |
| 5. Amm. and Potash .. | 98 | .. | 70 | .. | .. | 20/6 | 26.03 | 1.21 |
| 6. Soda and Potash .. | .. | 134 | 70 | .. | .. | 28/5 | 25.58 | 1.83 |
| 7. No manure .. | .. | .. | .. | .. | .. | .. | 23.75 | .. |
| 8. Amm. Pot. and Phosphate .. | 98 | .. | 70 | 175 | .. | 33/9 | 25.00 | 1.25 |
| 9. Soda Pot. and Phosphate .. | .. | 134 | 70 | 175 | .. | 41/11 | 26.07 | 0.95 |
| 10. No manure .. | .. | .. | .. | .. | .. | .. | 27.00 | .. |
| 11. Soda and Phosphate | 1 | 134 | .. | 175 | .. | 35/8 | 23.88 | 3.12 |
| 12. Amm. and Phosphate | .. | .. | .. | .. | .. | .. | .. | .. |
| 13. No manure .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 14. Arnott's early cane .. | 45 | .. | 14.5 | 150 | .. | 19/7 | 22.32 | .. |
| 15. Arnott's early cane .. | 45 | .. | 14.5 | 150 | .. | 19/7 | 26.12 | 2.32 |
| 16. No manure .. | .. | .. | .. | .. | .. | .. | 23.80 | .. |
| 17. Lime .. | .. | .. | .. | .. | 1 ton | 20/- | 23.39 | -0.41 |

TABLE II.—COMPARATIVE RESULTS OF EXPERIMENTS WITH UBA AND WHITE TRANSPARENT.

*Estate—Georgia.* *Field—Hanover.*

| | Juice % by Mill. | Sp. Gr. 30° 16 6 C. | Degrees Brix. | Sucrose % | Glucose % | Total Solids % | Glucose Ratio. | Purity. | Sucrose per ton of Canes. | % difference in favour of Estate Canes. |
|---|---|---|---|---|---|---|---|---|---|---|
| No. 400 Estate Canes Plant Cane one year old .. | 77.59 | 1.0640 | 16.6 | 13.00 | 1.75 | 17.66 | 13.46 | 73.61 | 225.94 | 21.07 |
| No. 401 Uba Cane Plant Cane one year old .. | 77.19 | 1.0572 | 15.0 | 10.32 | 1.67 | 15.86 | 16.18 | 65.06 | 178.33 | .. |

## FIELD EXPERIMENTS WITH FERTILISERS ON SUGAR CANE IN JAMAICA.

*Report on 25 years' work by H. H. Cousins, Director of Agriculture.*

Since 1901 co-operative field experiments with fertilisers have been carried out on sugar estates all over the Island. Results have been recorded on 126 different series in the parishes of St. Catherine, Clarendon, Vere, St. Elizabeth, St. Ann, Trelawny, St. James, Westmoreland and St. Thomas and published in various Special Reports, Bulletins and Annual Reports of this Department.

In addition to those recorded, a number of field experiments were laid out which were lost and not recorded owing to drought, hurricane, change of ownership, or neglect by the planters concerned, during the period of 25 years.

As a good deal of interest is being taken at the present time in the question of increasing the output of sugar in Jamaica by effective use of fertilisers, I consider that it would be helpful to planters to present a concise summary of the experiments already carried out in Jamaica on this matter with a brief statement of the practical result in each case.

The original scheme of Field Experiments as carried out in Jamaica was designed by the writer to suit the special circumstances of the Sugar Industry in Jamaica, which is that of a large number of relatively small areas of sugar cane each growing in soils and with rainfall and climatic conditions showing a wide variation.

Elaborate experiments with a very large number of plots in order to test out the finer variables in profitable manuring were therefore not suitable for our conditions in Jamaica. A series of 10 to 14 different plots with at least one and generally two " No Manure" plots was designed for the Jamaica experiments. A crushing in the estate mill of an average lot of the experimental canes with a juice analysis enabled the tonnage results to be calculated into juice and available sugar under the actual estate conditions.

Soil analyses, including the determination of available Potash and Phosphoric Acid and a Physical Analysis of soil and subsoil, were also generally carried out for each series.

As a result of experience the number of " No Manure" plots was increased in some of the later experiments. Large plots were not found to be more reliable than the standard plots as used in these experiments, viz.:—1/10 acre or 1 square chain.

### GENERAL CONCLUSIONS.

The experiments cover a period during which the price of sugar has varied from £6 per ton to £100 per ton (in 1920). From 1900 up to the outbreak of the war in 1914 the history of the Sugar Industry in Jamaica was discouraging and the exports of sugar had fallen to about 15,000 tons so that sugar at that time ranked rather as a " minor product" than as a leading staple in the Colony's trade.

After the war, encouragement was given by Imperial Preference and capital was invested in sugar so as to raise the export of sugar from Jamaica to a standard of 50,000 tons in 1927.

In many cases the limiting factor of sugar production on sugar estates in Jamaica is *water*. Where irrigation is not available the rainfall exercises a paramount influence on the problem of manuring. Under conditions of inadequate rainfall the expenditure of money on fertilisers by an estate thus situated is a gamble against the weather.

Under very bad conditions, fertilisers have actually reduced the yield due to the dying out of the soft young growth of canes as a result of acute drought at a later stage of development.

Under such conditions, mulching is more valuable than manuring with artificials. Where conditions of rainfall are reasonably steady, although not sufficient for maximum development of the canes, the use of fertilisers has been found profitable and planters now use them regularly.

In the old days, the system of "fly penning" the cattle on the cane lands was mainly relied on. It has been found that the use of fertilisers enables a larger area of canes to be grown at a profit than can be treated by the fly-penning system on a modern estate.

Where irrigation or a favourable rainfall enables large yields of sugar cane to be produced the use of fertilisers ceases to be a gamble and is a good commercial proposition.

The chief results to be gathered from these field experiments which merit the attention of planters are the following:—

### 1. Value of Lime.

Half a ton of slaked lime per acre every third year has given profitable increases of cane on many soi ls—where cheap power is available, the application of pulverised limestone has been found productive of increased tonnage while many estates have traditions extending over a century of the benefits accruing from an occasional application of " marl."

### 2. Nitrogen most Effective Fertiliser.

Where the conditions of growth enabled the crop to develop the application of 100 to 300 lbs. per acre of Nitrate of Soda or Sulphate of Ammonia has been generally profitable. On some soils, no other fertiliser appears to give profitable returns. In some instances, Nitrate of Soda has produced a marked result while Suphate of Ammonia failed to give a return. This is associated with lack of Lime in the soil and the acid resulting from the use of Sulphate of Ammonia. On the majority of soils, however, Sulphate of Ammonia appears to be the most successful form of Nitrogen to be applied to sugar canes in Jamaica.

" Nitrolim" and " Ammophos" are two of the newer fertilisers containing Nitrogen that are still under trial. The former is the cheapest form of combined Nitrogen now obtainable in Jamaica, while the latter possesses the advantage of being a soluble, neutral Phosphate as well as a source of Nitrogen. Experiments to test these fertilisers as against the other standard forms of Nitrogen are now under way.

### 3. Phosphates rarely Profitable.

In the early experiments we used a " Mixed Phosphate" prepared by blending Acid Superphosphate with neutral steamed bone flour. Basic Slag frequently gave results when the other Phosphates failed to do so. Further experiments revealed the fact that the good results for Basic Slag were apparently due to its content of Lime. In most cases in Jamaica Phosphates are not profitable as applied to sugar cane. The vendors of proprietary manures generally use a proportion of Superphosphate in their Special Cane Manures, based on English practice for the fertilisation of crops in the United Kingdom.

Our experiments showed that these proprietary manures were frequently inferior to and more costly than a suitable mixture of, say, Sulphate of Ammonia 2 parts, and Sulphate of Potash 1 part, which has been generally adopted by planters as a standard fertiliser for sugar canes in Jamaica.

### 4. Potash frequently Profitable.

In some cases Potash is absolutely necessary in a cane manure for certain soils in Jamaica. There are estates where Potash gives no return, but speaking generally, ½ to 1 cwt. of Sulphate of Potash (50%) per acre is a sound addition to a nitrogenous manure for canes in Jamaica.

5. Tillage and Drainage are of more importance as affecting the crop than the application of fertilisers. No expenditure on fertilisation can make up for defective cultivation or rectify unhealthy soil conditions brought about by lack of drainage.

The use of Steam-ploughs and resort to deep tillage has brought about some remarkable yields of cane, particularly in the heavier soils in Vere and St. Catherine.

H. H. Cousins,
Director of Agriculture.

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### Manurial Experiments on Sugar Cane.

*Summary of 25 years Field Experiments with Fertilizers under Estate Conditions in Jamaica.*

| Year. | Series. | Estate. | Parish. | Results. |
|---|---|---|---|---|
| 1902 | 1 | Albion .. | St. Thomas | Inconclusive. |
| | 2 | Caymanas .. | St. Catherine | Profitable. Complete Manure profits £6 per acre. |
| | 3 | Amity Hall .. | Vere | No increase. |
| | 4 | Money Musk | Vere | Lost through drought. |
| | 5 | Hillside .. | Vere | Lost through drought. |
| | 6 | Holland .. | St. Elizabeth | Lime gave 18 tons, Potash marked effect. |
| | 7 | Mount Eagle | Westmoreland | 2 cwt. S. of A. paid best. |
| | 8 | Cinnamon Hill | St. James | Manures reduced yield. |
| | 9 | Vale Royal | Trelawny | Small increases. Financial loss. |
| | 10 | Llandovery | St. Ann | No profit |

*Summary of 25 years Field Experiments with Fertilizers under Estate Conditions in Jamaica, Continued.*

| Year. | Series. | Estate. | Parish. | Results. |
|---|---|---|---|---|
| 1904 | 11 | Amity Hall | Vere | Loss of money. |
| | 12 | Hillside | Vere | With irrigation. Lime, Nitrate and Potash paid best. |
| | 13 | Albion .. | St. Thomas | Inconclusive. |
| | 14 | Holland .. | St. Elizabeth | No results recorded. |
| | 15 | Caymanas .. | St. Catherine | Inconclusive |
| | 16 | Vale Royal | Trelawny | Increases not profitable |
| | 17 | Llandovery | St. Ann | No profit |
| 1905 | 18 | Amity Hall | Vere | Irrigation—Inconclusive |
| | 19 | Hillside .. | Vere | 3 cwt. Slag, 3 cwt. Nitrate ½ cwt. Potash paid 29/5d. per acre. |
| | 20 | Money Musk | Vere | Small increases but no profit. |
| | 21 | Long Pond | Trelawny | 3 cwt. Phos. 2 cwt. Sulphate of Ammonia, ½ Potash paid 57/5d. per acre. |
| | 22 | Albion .. | St. Thomas | Canes lost through drought. |
| | 23 | Caymanas | St. Catherine | Plots lost—No results. |
| | 24 | Vale Royal | Trelawny | Inconclusive. Field irregular. |
| | 25 | Llandovery | St. Ann | 91/3d. profit on ratoons from complete manure. |
| 1906 | 26 | Hillside | Vere | Fertilizers gave no profit. Lime gave 5.7 tons cane. |
| | 27 | Pusey Hall | Vere | 1½T. lime, 1 cwt. S. of A., ½ cwt. Potash payable. |
| | 28 | Fairfield .. | St. James | Inconclusive. Lime paid. |
| | 29 | Richmond | St. Ann | Inconclusive. |
| | 30 | Cave Valley | St. Ann | Lime and Nitrogen payable. |
| | 31 | Money Musk | Vere | Loss on manuring. |
| | 32 | Hampden .. | St. James | Loss on manuring. |
| | 33 | Iron Shore .. | St. James | Complete manure paid 21/10d. per acre. |
| | 34 | Vale Royal .. | Trelawny | Loss on manuring. |
| | 35 | Green Park .. | Trelawny | Crop lost from drought. |
| | 36 | Llandovery .. | St. Ann | Complete manure paid over 4 years total profit £13 per acre. |
| 1907 | 37 | George's Plain | Westmoreland | Lime and complete manures paid. |
| | 38 | Blue Castle .. | Westmoreland | Loss on manuring. |
| | 39 | Shrewsbury .. | Westmoreland | Loss on manuring. |
| | 40 | Friendship .. | Westmoreland | Complete manure paid. |
| | 41 | Denbigh .. | Clarendon | Complete manure and lime paid. |
| | 42 | Parnassus .. | Clarendon | Inconclusive. Lime successful. |
| | 43 | Money Musk | Clarendon | No results recorded. |
| | 44 | Long Pond | Trelawny | Value of liming. |
| | 45 | Richmond .. | St. Ann | Not profitable. |
| | 46 | Green Park | Trelawny | Ammonia plus Potash paid 46/3d. per acre. |
| 1908 | 47 | Bluecastle .. | Westmoreland | Plots destroyed. |
| | 48 | Shrewsbury .. | Westmoreland | Results inconclusive. |
| | 49 | Mount Eagle | Westmoreland | Loss. |
| | 50 | Friendship .. | Westmoreland | Lime paid £7 9s. 0d. Double complete manure paid £10 7s. 4d. |
| | 51 | George's Plain | Westmoreland | Lime paid also Nitrate and Potash. |
| | 52 | Fontabelle .. | Westmoreland | Lime paid 42/. Small increase from complete manure. |
| | 53 | Cinnamon Hill | St. James | Not recorded. |
| | 54 | Dundee .. | St. James | Inconclusive |
| | 55 | Content .. | St. James | No records. |
| | 56 | Richmond .. | St. Ann | Complete manure with super gave profit £7 14s. 4d. in two years. |
| | 57 | Llandovery .. | St. Ann | Inconclusive. |
| | 58 | Parnassus .. | Clarendon | Not recorded. |
| | 59 | Hillside .. | Vere | Lime paid £8 5s. 6d. Fertilisers successful. |
| | 60 | Money Musk | Vere | 18/ profit from complete manure. |
| | 61 | Bog .. | Vere .. | Plots lost. |
| | 62 | Holland .. | St. Elizabeth | Lime paid £7 per acre. Fertilisers small effect. |
| | 63 | Hyde Hall .. | Trelawny | No profits. |
| | 64 | Georgia .. | Trelawny | Loss on manuring. |

## Manurial Experiments on Sugar Cane.

*Summary of 25 years Field Experiments with Fertilizers under Estate Conditions in Jamaica, Continued.*

| Year. | Series. | Estate. | Parish. | Results. |
|---|---|---|---|---|
| 1909 | 65 | Manchester Pen | Trelawny | Lime and Nitrogen successful. |
| | 66 | George's Plain | Westmoreland | Lime, Nitrogen and Potash best. |
| | 66A | Hillside .. | Vere .. | Slag Ammonia and Potash paid. |
| | 67 | Vale Royal .. | Trelawny | No profit. |
| | 68 | Shrewsbury . | Westmoreland | £6 per acre from liming. |
| | 69 | Dundee .. | Trelawny | Inconclusive. |
| | 70 | Georgia .. | Trelawny | Loss on manuring. |
| 1910 | 71 | Vale Royal .. | Trelawny | Inconclusive. |
| | 72 | Arcadia .. | Trelawny | Inconclusive. |
| | 73 | Hampden .. | St. James | Inconclusive. |
| | 74 | Mesopotamia | Westmoreland | Complete manure profitable. |
| | 75 | Blackheath | Westmoreland | Ashes and stable manure did best. |
| | 76 | Holland .. | St. Elizabeth | Marked effect of lime. |
| | 77 | Parnassus .. | Vere | Loss on manuring. |
| | 78 | Perrins .. | Vere | Inconclusive. Big yield without manure. |
| | 79 | Cherry Garden | St. Catherine | No results from manuring. |
| | 80 | Shrewsbury | Westmoreland | Manures unprofitable. Lime effective. |
| 1911 | 81 | Shrewsbury .. | Westmoreland | Complete manure paid 51/4. |
| | 82 | Catherine Hall | St. James | Nitrate superior to Ammonia. Forking land gave 12 tons per acre. |
| | 83 | Hampden .. | St. James | No residual effect from previous year's manuring. |
| | 84 | Mesopotamia | Westmoreland | 2 cwt. Nitrate paid 37/ per acre. 3 Slag, 1½ Nitrate, 1 Potash gave profit 75/. |
| | 85 | Blackheath | Westmoreland | Nitrate and Potash paid 18/10d. No residual effect from fertilisers applied to plants or ratoons. |
| | 86 | Catherine Mount | St. James | Lime paid 20/ per acre. Fertilisers did not pay. |
| 1912 | 87 | Shrewsbury .. | Westmoreland | Ammonia and Potash paid 22/6d. per acre. |
| | 88 | Blackheath .. | Westmoreland | 2 cwt. S. of Ammonia lost 7/ per acre. 1½ Ammonia 1 cwt Potash paid 26/6d. per acre. |
| | 89 | Northern Estates | St. James | Inconclusive. |
| 1913 | | 9 Series .. | .. | Lost through droughts and hurricane. |
| 1914 | 98 | 9 Series | .. | Affected by droughts. Sulphate of Ammonia only fertiliser that paid. |
| 1915 | 103 | 5 Series .. | .. | Indications that cultivation and rain chief factors in production. |
| 1916-1920 | .. | .. | .. | Manurial Experiments suspended due to war conditions. |
| 1921 | | Of 15 Series only 8 gave recorded results. | | |
| | 104 | Caymanas .. | St. Catherine | Nitrogen and Potash gave 14-17 tons increase of crop. |
| 1921 | 105 | Worthy Park | St. Catherine | Ammonia and Potash gave 5.6 tons. Lime gave 7.1 tons. |
| | 106 | Bluecastle .. | Westmoreland | Nitrogen gave a profit. |
| | 107 | Richmond .. | St. Ann .. | Ashes gave 4.3 tons. Nitrogen and Potash gave 2.5 tons. |
| | 108 | Amity Hall .. | Vere .. | 2 cwt. S. of Ammonia gave 4.3 tons. |
| | 109 | Georgia .. | Trelawny | Nitrogen gave a profitable increase. Lime depressed yield. |
| | 110 | Long Pond .. | Trelawny | 2 cwt. S. of Ammonia and 1 cwt. S. of Potash gave 10.9 tons. Pen manure gave 9 tons. |
| | 111 | Catherine Hall | St. James | Manures gave small increase. |

## Manural Experiments on Sugar Cane.

*Summary of 25 years Field Experiments with Fertilizers under Estate Conditions in Jamaica, Continued.*

| Year. | Series. | Estate. | Parish. | Results. |
|---|---|---|---|---|
| 1922 | 112 | Long Pond .. | Trelawny | Potash essential. Nitrogen and Potash profitable. |
| | 113 | Georgia .. | Trelawny | Nitrate of Soda and Potash did best. |
| | 114 | Swanswick .. | Trelawny | Cattle dung best, then Ammonia or Nitrolim. Potash not required. |
| | 115 | Orange Valley | Trelawny | Nitrate of Soda and Potash gave 4.6 tons. |
| | 116 | Chesterfield | Vere | Lime gave 8.5 tons, 2 cwt. Nitrogen-Ammonia gave 5 tons. |
| | 117 | Pusey Hall .. | Vere | Nitrogen gave 3.6 tons. Lime gave 2 tons. |
| | 118 | Bernard Lodge | St. Catherine | Plots irregular. Results inconclusive. |
| | 119 | Worthy Park | St. Catherine | 1 ton Lime paid, Sulphate of Ammonia gave 3 to 8 tons. Nitrate and Ashes gave 3 to 6 tons. |
| | 120 | Worthy Park | St. Catherine | ½ ton Lime followed by 2 cwt. S. of Ammonia gave 6.5 tons. |
| | 121 | Sweet River | Westmoreland | Lime gave 12 tons, Nitrate gave 9-12 tons, S. of Ammonia unsuccessful. |
| | 122 | Bogue .. | Westmoreland | Inconclusive. |
| 1923-1924-1925—(3 years devoted to Campaign against Mosaic Disease). | | | | |
| 1926 | 123 | Catherine Hall | St. James | Inconclusive. |
| | 124 | Springfield .. | Vere | Lime gave 5.4 tons and a profit of 60/. Fertilisers gave no results. |
| | 125 | Llandovery | St. Ann | Lime gave 5.4 tons and a profit of 62/. Nitrogen and Potash gave results. |
| (10 Series were not recorded.) | | | | |
| 1927 | 126 | Richmond .. | St. Ann | Inconclusive. |
| (4 Series, due to drought and other causes, not recorded.) | | | | |

## Experiment Station.

*Report of the Plant Breeder.*

*Canes.*—There was a very limited demand for Uba cane tops this year but there was a big demand throughout the year for the newer and better seedling varieties and a total of 191,960 tops and cuttings have been distributed, 45,766 more than last year. The following is a list of the varieties and quantity of each distributed:—

| | |
|---|---|
| B.H. 10 (12) .. .. | 100,544 |
| Ba. 11569 .. .. | 38,958 |
| White Transparent .. | 16,330 |
| Mexican Striped .. | 5,975 |
| B. 1529 .. .. | 5,652 |
| Uba .. .. | 5,509 |
| Badila .. | 4,900 |
| S. C. 12/4 .. .. | 3,477 |
| J. 72 .. .. | 3,340 |
| Ba. 6032 .. .. | 2,850 |
| C. 553 .. .. | 743 |
| H. 109 .. .. | 702 |
| Uba Hybrid No. 1 .. | 535 |
| C. 35 .. .. | 500 |
| C. 768 ... ... | 400 |
| P.O.J. 2727 .. .. | 400 |
| P.O.J. 2725 ... .. | 250 |
| P.O.J. 2379 .. .. | 150 |
| D. 95 ... .. | 145 |
| P.O.J. 213 ... ... | 100 |
| P.O.J. 234 ... .. | 100 |
| P.O.J. 826 ... .. | 100 |
| B.S.F. 12 (48) .. | 100 |
| B.S.F. 12 (50) .. | 75 |
| B. 295 .. .. | 75 |
| B. 417 ... ... | 50 |
| Total ... | 191,960 |

There has been a continuous demand for cuttings of the B.H. 10 (12) and Ba. 11569. The former is fast becoming the standard cane of the Island, and has given good results both as plant canes and ratoons. The latter is doing well in the loamy-soil districts of the Island, and reports have come to hand where this variety has given approximately 70 tons canes per acre. The cultivation of both these varieties are being extended in the Experiment Station to meet the demand for tops.

The demand for the newer varieties has been fairly large and owing to our limited quantity these demands could not be supplied in full, but preparations are being made to supply larger quantities of tops during the fall next year.

Two fields were cleared of old cane stumps, and ploughed and trenched, and the following new varieties planted out with the hope of being able to cope with the demand for them during the planting season of 1928, viz:—H. 109, S.C. 12/4, B. 417, Mexican Striped, C. 768, C. 553, C. 35, P.O.J. 2727, P.O.J. 2725, P.O.J. 234, P.O.J. 213, P.O.J. 2379, C.H. 64 (61).

The varieties which were planted out in quarantine on land near the Government Laboratory for the past two years, having developed no disease during this period, it was considered safe to remove them to the Experiment Station for further trial and distribution.

Planters are so pleased with the results obtained from the seedling canes, that we have been asked to conduct varietal Experiment Plots on their estates, and I hope during 1928 to have several of these in the various cane districts of the Island.

*Bananas.*—The old plots of varieties of bananas have been dug out and replanted with selected varieties. The usual methods of cultivation, pruning and irrigation were carried out and the entire field presents a healthy appearance.

Experiments in cross-pollination were carried out during the year.

*Mangoes.*—During the year budding of mango trees was continued with success. A good crop was reaped and a record amount sold. Most of the trees suffered badly again this year from an attack of thrips.

*Cacao.*—The young trees set out during 1926 are doing well. A good crop was obtained and harvesting, fermenting and curing were carried out by the Students of the Farm School.

*Coffee.*—During the year a fair crop was reaped. The usual pruning was done when necessary.

*Citrus.*—A nursery of Sour Orange and Grapefruit seedlings has been planted out for budding during 1928.

The old citrus trees were sprayed several times during the year with Lime-Sulphur wash against the Citrus Black Fly. Two budded Pine apple orange plants obtained from Mr. Sommerville were planted out in the grove, and several seedling grapefruit were sent out as stock for budding other varieties. Both the Navel orange and Grapefruit trees bore heavily this year.

*School Garden.*—A large crop of vegetables comprising Tomatoes, Cabbages, Cucumbers, Peppers, Garden Eggs, Sweet Cassava and Peas was grown by the Students of the Farm School.

*Agricultural Education.*—The Students of the Farm School continued to visit the Experiment Station for five days each week and received instructions in the cultivation of the various crops mentioned. They have done practical work in making and applying insecticides and fungicides; also in ploughing, forking, pruning and irrigating.

Special attention was paid to the reaping, fermenting and curing of Cacao and Coffee, as well as to budding and grafting by approach in connection with Bombay Mangoes.

Mr. L. A. Powell, the Master in charge of the Students in Practical Agriculture, has taken a keen interest in this part of his work.

M. S. Goodman,
Plant Breeder.

## IV.—CONTAGIOUS DISEASES OF ANIMALS.

*Report of Government Veterinary Surgeon.*

### 1. Government Farm School, Hope.

I have continued to lecture in the Farm School to the three classes of Students on a schedule of six hours a week, and in addition conducted demonstrations in veterinary procedures whenever opportunity offered.

The Farm animals have furnished material for the education of the Students in such diseases as tuberculosis of cattle, infectious bovine abortion, sores, penetrating wounds, bowel troubles and pneumonia of calves, tick fever and anaemia and fowl cholera in particular.

### 2. Government Stock Farm, Hope.

(i) *Tuberculosis of cattle.*—Three intra-dermal tuberculin tests were conducted during the year on all the cattle on the Farm over four months of age as follows:—

(a) Test between Jan. 29th and Feb. 12th.—January test: 359 cattle were tested. Result 20 reactors (5.56%).

(b) Test July 8th–16th.—303 cattle over four months old tested. Result one reactor (0.33%).

(c) Test Nov. 21st–Dec. 8th.—December test: 312 cattle over four months old tested. Result one reactor (0.32%)

All 22 reactors were removed from the herd, killed and examined post-mortem. In all but two cases clear evidence of the disease was discovered.

Study of the type of lesions found in these cases indicate that the Imported Jersey Bull, Pogis, is probably the origin of the infection of the Farm. The lesions exhibited by this animal were the oldest found in any of the cases, and most of the cows reacting to the test are known to have been in close association with him at various times during the last two or three years.

(ii) *Tick Fever* (*Piroplasmosis of cattle*).—Two acute cases of this disease occurred during the year with fatal results in one of the cases.

(a) Imported Guernsey bull, Gladiator, landed 20.5.27, developed acute tick fever 11.7.27 and though twice treated with trypan blue he succumbed on the 16.7.27. As the trypan blue used in the treatment of this animal was of different make than that used on previous occasions, and neither injection had the slightest effect in the prompt reduction of temperature, it seems entirely probable that the substance used on this occasion was therapeutically inert. During the Great War when the regular brand of trypan blue employed on the Farm could not be obtained, similar experience with inert brands was observed.

(b) Imported Jersey bull, Glen, landed 9.5.27 developed an acute attack on 3.8.27 after two mild previous attacks. The use of trypan blue injections of different brand from that given to the Guernsey, Gladiator, resulted in his prompt recovery.

Experience at the Farm extending over many years has shown that early intravenous injections of potent solutions of trypan blue is a specific treatment for tick fever arising from the blood parasite, Piroplasma bigeminum.

(iii) *Wounds by penetrating objects such as nails, staples, stakes, etc.*—This type of wound, in horses and mules especially, is so frequently followed by fatal attacks of tetanus, that it is the practice to give such affected animals early preventive injections of tetanus antitoxin after injury. In this way six mules were treated with satisfactory results.

Several of the cattle, particularly the working steers, also gathered nails or staples in the feet, but, as this species is not very susceptible to tetanus, reliance is placed on local wound treatment only, and in each case the method was attended with good results.

(iv) *Fowl Cholera* (*Hemorrhagic Septicaemia of Poultry*).—This infection has appeared off and on among the poultry and entailed some loss. On some occasions outbreaks appear to have been connected with the bringing on to the Farm of outside birds for table use.

As a protective measure the entire flock (19 males, 29 females) were immunized on 18.8.27 with ½ cubic centimetre injections of Hemorrhagic Septicaemia Aggressin. Subsequently no more cases of the disease developed during the year.

(v) *Blackleg of Cattle.*—No cases of this injection have yet been observed at the Farm. However, it is such a common affection of cattle that it was deemed advisable to immunize all animals on the Farm of susceptible age, and for the additional reason that often animals are taken from Hope to infected parts of the Island. Accordingly 111 cattle of susceptible age were treated with Blackleg Aggressin (Natural), between Sep. 15th and Oct. 6th.

### 3. Grove Place Stud Farm.

(1) Eleven official visits were made to this Farm during the year.

(ii) Between April 25th and May 30th, 420 cattle of the Farm were tested for tuberculosis by the intra-dermal method. No reactors to the test were found.

The number includes all the cattle thereon at date of the test, except animals under six months of age and *six* older ones, which were not secured for the test on each of five visits for the same.

(iii) As this property has in the past sustained losses from Blackleg, annual vaccination of susceptibles with Blackleg Aggressin (Natural) has been maintained with good results.

### 4. Animal Diseases listed under the Law (Law 29 of 1922).

(*i*). *Foot and Mouth Disease.*—(a) There has been no recurrence of this disease during the year, in fact, not since the end of July, 1926, when the last cases of the outbreak at and around Charlottenburg Estate (Midgham) in Westmoreland occurred. Although that recurrent outbreak was stamped out by slaughter and no fresh cases developed after the end of July of 1926, it was deemed advisable in view of the previous history of the infection in that parish to maintain quarantine restrictions on the western two-thirds of the parish for at least 12 months subsequent to the date of the outbreak. Accordingly supervision and restrictions on the area were maintained until July 1st, 1927. (Vide Order of Revocation of Gazette of June 23rd, 1927).

The post-outbreak quarantine of approximately nine months was conducted with Mr. H. Campbell Maxwell in charge locally and periodic visits to the area by myself.

(b) Six occurrences of a suspicious nature were reported during the year, 3 in Westmoreland, 1 in St. Catherine, 1 in St. Thomas and 1 in St. Mary. All these when investigated proved negative of Foot and Mouth infection.

(ii.) *Anthrax.*—Nine suspected outbreaks were reported to the Department and all were investigated with negative findings of this disease. In three of the cases Blackleg was clearly the cause of the report, in four others no sick or dead animals could be found for examination, and in the remaining two, the death of the single animals was due to non-specific cause.

It seems customary for stockmen to assign any sudden or mysterious deaths of animals to this disease, even when there are no suggestive indications of this malady: consequently, it is not surprising that so many of the reports made to the Department prove upon investigation to be unfounded.

(iii.) *Swine Fever or Hog Cholera.*—Two suspected outbreaks were referred to the Department. Neither was established to be genuine. One in Manchester was clearly pneumonia from damp conditions and overcrowding, the other, fatal diarrhoea, from an excessive diet of mangoes.

No personal investigation was made of the mortality of swine in St. Elizabeth, during the latter part of the year, as represented by the Jamaica Agricultural Society. From what I have been able to ascertain, it may be assumed that most of the loss was caused by pneumonia incident to the October rainy season. This has been the experience in that parish in the past, when swine mortality therein was investigated at the same period of the year.

### 5. Other Animal Diseases.

(i.) *Blackleg.*—As this is not a notifiable disease under the Law only incidental reports of its occurrence reach the Department. Generally speaking, most large cattle owners practise immunization with various forms of vaccines, but many small settlers lose their young animals and are not aware of the protective value of vaccination. For this reason it is gratifying to note that the Instructors of the Jamaica Agricultural Society are not only stimulating the peasantry to use vaccines, but in many cases giving actual demonstrations of its application.

(ii.) *Lungworms of Cattle* (*Strongylus micrurus*).—Only two enquiries regarding this disease were received in the year. This, however, can hardly be an index of its occurrence, for it is a malady frequently met with in young cattle, especially on moist mountain valley pastures.

(iii.) *Haematuria of Cattle.*—Most reports still come from Manchester, occasionally a case is reported elsewhere.

Tentative treatment by intravenous injections of tartar emetic in the hands of one stockman has been helpful as a curative measure, but unfortunately the treatment does not preclude recurrent attacks in the treated animal or materially lessen the incidence of the disease on his property.

The specific cause of the disease has not been determined.

### 6. Tick Eradication and Control.

During April and May, 48 properties were visited for inspection, 2 in Hanover, 7 in Westmoreland, 4 in Clarendon, 14 in Manchester, 21 in St. Elizabeth.

It is evident that the existing Orders dealing with this matter have accomplished much good in the suppression of the tick pest, but much improvement in a general way remains to be accomplished. Strict conformity with the requirements of Orders, especially in the fortnightly dipping of cattle, is not the prevailing custom, and without adherence to such regular practice satisfactory advancement cannot be obtained. Accordingly some properties show a greater infestation of ticks than obtained a couple of years ago. There is now a decided tendency to laxity in this important effort to advance the well-being of the live stock industry and its economic effect will soon be felt.

### 7. School for Sanitary Inspectors.

Assistance in the form of three lectures and two demonstrations was given in November. The subjects were Meat and Dairy Inspection. Absence off and on in the country precluded a more comprehensive course in these subjects.

### 8. Inspections of Animals for Export.

| Date. | Animals. | Origin. | Destination. |
|---|---|---|---|
| 14.10.27 | Nellore bull " Pondur" | Hope Stock Farm | Costa Rica. |
| 15.10.27 | Stallion, " Secret Service" | Kingston | Porto Rico. |
| 3.12.27 | Proof Ass. | Knockalva | British Honduras. |

### 9. Inspections of Imported Animals.

*Horses*—1 child's pony from Cayman Islands.
*Mules.*—6 from U.S.A. to United Fruit Company.
*Catile.*—Bulls only.
1 Jersey to Department of Agriculture from U.S.A.
1 Guernsey ditto
2 Red Polled to Arthur McGrath, Esq., from U.S.A.
1 Hereford ditto
1 Polled Angus to G. P. Dewar, Esq., from England.
1 Jersey bull calf to J. P. Broderick, Esq., from U.S.A.
*Sheep.*—2 rams to G. P. Dewar, Esq., from England.
*Swine.*—1 Poland China to Jamaica Agricultural Society from Canada.
*Dogs.*—39 from England.

S. Lockett, V.M.D.
Government Veterinary Surgeon.

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### *Report on American Foulbrood of Bees for* 1927.

1. Operations for the eradication of this disease were instituted in July, 1926, immediately after it discovery in the Four Mile District along the Kingston-Spanish Town Main Road.

2. During the six months ending December, 1926, 25 of the 106 listed apiaries in Kingston-St. Andrews showed infection (23.5%).

In this period of six months, 263 colonies in the 25 affected apiaries were destroyed by burning in accordance with Orders under the Law (Law 9 of 1918)—211 colonies in 8 totally destroyed apiaries and 52 in the remaining 17 affected apiaries.

3. During 1927 the number of listed apiaries increased to 116. These with the 8 totally destroyed make 124 under supervision during the 18 months of the campaign to end of 1927.

Twenty-four of the 116 existing apiaries of 1927 were supervised as " infected," with the following showing:—

(i) Eleven ceased to exhibit infection after the close of 1926.

(ii) Thirteen remained infected or exhibited initial infection during the six months ending 30th June.

(iii) No infection of any of the 116 apiaries of the " Declared Area" was found during the September and December quarterly inspections, hence the " area" may be deemed clean for the six months ending December, 1927.

4. In keeping with the provisions of the operative Order under the Law—The Protection from Disease (Bees) (Foulbrood) Order (No. 2), 1926—all infected colonies have been consistently destroyed by burning.

The total destruction of apiaries and colonies during the 18 months of the campaign is:—

8 apiaries in toto and 287 colonies.

5. The field work of inspection has been carried through by Inspectors Henry S. Holt, Arthur L. Holt, (until his resignation) and S. A. Hibbert appointed in lieu of Arthur L. Holt. (Vide Gazette October 27th, 1927).

S. Lockett,
" Person under the Law."

## V.—PLANT DISEASES AND PESTS.

*Report of the Advisory Committee on the Banana Industry.*

The members of the Board during 1927 were:—Hon. J. H. McPhail, Hon. L. A. Isaacs, Hon. T. J., Cawley, J. Roy Johnson, Esq., G. J. Goble, Esq., F. A. Cory, Esq., P. Lindo, Esq., J. R. Barclay, Esq. O.B.E., The Director of Agriculture, (Chairman), The Entomologist, The Supervising Inspector and the Microbiologist (Secretary).

Two meetings were held during the year.

As hitherto a great deal of the business was transacted by means of circulated papers, 87 of which were dealt with during the year. The reports of Inspectors were circulated each week and the report of the Supervising Inspector and the Panama Disease summaries were circulated each month. A number of other matters were also dealt with in this way.

The Committee made a recommendation which was approved by the Governor in Council for a system of graduated treatment for Panama Disease in any district where in the view of the Director of Agriculture the disease was sufficiently prevalent to necessitate a reduction in the size of the area to be treated and quarantined.

It was decided that in view of the risk of spreading Panama Disease by means of soil attached to root crops that from April 1st, 1928, no compensation should be paid for bananas or root crops where the latter were grown between bananas. The date was put forward in order to allow fair notice to be given to owners of mixed cultivations.

The Banana Trash Order was amended during the year.

Numerous matters of minor importance were also disposed of at the meetings.

The official figures of cases of Panama Disease treated during1927 are:—

| Month. | Diseased Roots. | New Cases. | Recurrences. | Total Cases. |
|---|---|---|---|---|
| January .. | 2,494 | 134 | 1,086 | 1,220 |
| February .. | 3,435 | 187 | 1,432 | 1,619 |
| March .. | 3,162 | 248 | 1,335 | 1,583 |
| April .. | 2,707 | 172 | 1,472 | 1,644 |
| May .. | 2,958 | 172 | 1,340 | 1,512 |
| June .. | 3,712 | 177 | 1,406 | 1,583 |
| July .. | 2,770 | 175 | 1,307 | 1,482 |
| August .. | 3,335 | 254 | 1,337 | 1,591 |
| September .. | 3,475 | 168 | 1,929 | 2,097 |
| October .. | 3,476 | 194 | 1,462 | 1,656 |
| November .. | 4,036 | 219 | 1,876 | 2,095 |
| December .. | 4,477 | 232 | 1,885 | 2,117 |
| Total 1927 .. | 40,137 | 2,332 | 17,867 | 20,199 |
| Total 1926 .. | 21,151 | 1,710 | 9,594 | 11,304 |
| Total 1912-27 | 93,632 | 7,667 | 38,783 | 46,450 |

The Disease appeared in the following districts for the first time:—St. Elizabeth, Glengoffe, Stewart Town, Brown's Town.

F. E. V. Smith,
Microbiologist and Secretary to the Committee,

*Report of the Government Microbiologist.*

PLANT DISEASES IN JAMAICA IN 1927.

This report refers to eight months work only, being the period since my arrival in the Island on April 26th, 1927.

*Bananas. Panama Disease.* (*Fusarium cubense, Sm.*)—The official returns of the cases treated during the year are given in the report of the Secretary of the Advisory Committee on the Banana Industry. There has been an increase in the cases treated but it is noteworthy that the parish of Portland still retains some 70% of the total.

The method of treatment has continued in general as before, but an extension of the reduced treatment, eight roots in addition to the diseased one, has been authorised for any part of the Island in which the Director of Agriculture considers it warranted.

It appeared that a thorough knowledge of the disease in the field and the influence of local conditions should be gained before initiating any experimental work. To that end a considerable portion of the earlier months was spent in travelling.

Experimental work has now commenced on certain lines but the most promising line of attack would appear to lie in the raising of a suitable resistant variety. The control of the banana breeding work has therefore been transferred to this office.

At the suggestion of a planter, further experiments were carried out in treating infected soil with common salt. It was found that *Fusarium cubense* could grow in media containing up to at least 2½% of salt, and as this represents a salinity too high for the banana plant, the experiment was carried no further.

*Other Banana Diseases.*—Bonnygate Disease (*Sphaerostilbe musarum*, Ash.) and Black Spot (*Cercospora musarum Ash.*) were occasionally met with in districts favourable to them.

The trouble locally known as 'Watersoak' occurred fairly frequently in badly drained land. Inspectors are often called upon to examine cases of this disease which is confused by many growers with Panama Disease on account of the discolouration of the vascular bundles which it produces. The symptoms in the two diseases are quite distinct; in Watersoak the discolouration is blackish and quite unlike the colour produced by Fusarium. In addition in Watersoak the discoloured bundles are in the centre of the stem which is a part that invariably remains clean in cases of Panama Diseases.

Frequent enquiries have been received concerning unhealthy bananas in which no pathogenic organisms were present. There are a number of such troubles which can be traced to physiological disorders arising from unsuitable soils and wrong cultivation. In many such soils there is a noticeable deficiency in humus and nitrogen while frequently there is a preponderence of 'shot' and pyrites. In some instances the conditions are so absolutely opposed to the requirements of the banana that they do not merit further study but in many others the best means of incorporating humus needs investigation. This appears to be most readily achieved by means of green crops, a practice already in existence but which requires more critical experiments for its further development.

In wet hilly districts the disease attributed to Marasmius was common. Here again better cultivation and clearing of bush should reduce the damage sufficiently to repay the cost of the work.

*Sugar Cane. Mosaic.*—There appears to be a further reduction in this disease and many plantations are becoming sufficiently free to induce replanting with the heavier but susceptible varieties. The trial and distribution of new varieties is in the hands of the Superintendent of Public Gardens.

A little 'Root Disease' and occasional cases of leaf spots were reported but on the whole there appears to have been no serious outbreak of any disease in this crop.

*Coconut.*—No serious cases of disease have occurred. Bud Rot appeared in odd trees in St. Thomas and other places but there was no epidemic.

Some plantations in St. Thomas became unsightly from Leaf Die Back (*Diplodia sp.*) The trees should respond to more hygienic conditions and generous cultivation. In severe cases the leaves were cut back to the bud and the cut surfaces sprinkled with Bordeaux Powder.

My attention was called, in the early part of the summer to unhealthy trees in the Above Rocks district of St. Andrew. They had a yellow appearance and the leaves were dying off prematurely. *Pestallozzia palmarum*, Cke. was the only parasitic fungus present, but this is usually regarded as a secondary organism. In this case the real trouble appears to lie in the conditions under which the trees were growing. In the majority of instances the trees have been planted on ridges and where there is often only a thin layer of soil. Under these conditions moisture drains away rapidly which is unfavourable to a moisture-loving plant such as the coconut. Affected trees have responded to the treatment recommended for leaf die-back but there is no reason to suppose thet they will not be affected in a similar manner at any future time when a drought is experienced in this area.

*Citrus.*—It is difficult to generalise on the diseases of this crop as it has been neglected for some years in most parts of the Island. The varieties and root-stocks are very mixed and this tends to complicate any investigation into the diseases.

There are indications of the existence of root diseases, and of their past destruction. Should the citrus industry revive to any appreciable extent an investigation into the most suitable varieties and more particularly into types of root-stocks and their suitability to soils and their relation to disease resistance would be essential. A considerable amount of information on this matter could be acquired from existing old trees on plantations which have had such diseases in the past.

The most apparent of other diseases was Scab (*Sporotrichum citri*, Doid. & Butl.) which caused defoliation and retarded growth in seedling sour orange grown for stocks. This disease would respond to spraying.

A single case of Thread Blight injury to tips of grape fruit twigs by *Corticium* (?) *Koleroga*, v. Hohn. was recorded.

The red fungus parasite of white fly (*Aschersonia aleuroidis* Webb.) is fairly well distributed and the brown fungus (*Aegerita Webberi*, Faw.) is frequent in some district. An unsuccessful attempt was made to transfer the former to Pimento white fly, (*Aleurodicus pimentae*, Lg.)

*Coffee.*—Brown Eye spot (*Cercospora coffeicola*, B. & C.) was common but rarely of any consequence.

*Other Crops.*—Leaf Mould (*Cladosporium fulvum*) has been very common on tomatoes, though frequently confused with other diseases of this crop. Many of the lesser food crops suffer from diseases which owing to misuse of common names are very much confused. A close watch is being kept on these crops and through the medium of the Agricultural Instructors the confusion which exists should be cleared up and better measures taken to prevent loss from disease. In most cases diseases appear and are allowed to become prevalent merely from lack of knowledge as to the requirements of crop in the way of cultivation.

Mosaic diseases are very common on many crops especially on beans and Solanaceous crops. In the former the introduction of resistant varieties should help considerably.

The demand for fermentation work has been very limited due largely to depression in the rum industry. Fresh isolations of yeasts are being made to satisfy any requests for 'starters.'

Several importations of plants have been examined during the year. With the exception of one consignment of seed potoates, all were in satisfactory condition.

In conjunction with the hybridising of orchids by the Horticulturist, experiments are being conducted on the asymbiotic germination of orchid seeds. These have resulted in a fair measure of success and improvement is expected during 1928 when the technique is better developed.

In conclusion I wish to express appreciation of the assistance and collaboration of members of the Department and from the Staff of the Agricultural Society, especially the Entomologist, Plant Breeder, Supervising Inspector and the Secretary of the Agricultural Society.

F. E. V. Smith,
Government Microbiologist.

## V.—PLANT DISEASES AND PESTS.

### *Report of Banana Breeding Experiments.*

Since June, 1927, the control of this work has been transferred to the office of the Microbiologist, though Mr. Sutherland has continued to take an active part in the experiments he initiated at Castleton and at the station in the hills.

The plot at Hope has been reserved solely for investigation of new methods of pollenation in an endeavour to obtain seeds from those varieties which have remained absolutely sterile up to the present. These experiments have been conducted in connection with laboratory studies of the banana flower. The common edible varieties of banana have also been pollenated with their own pollen in an attempt to ascertain whether these forms have fixed characters.

None of the hybrids has fruited during the year under review, but many are in such an advanced stage of growth that a number of them should fruit during the spring of 1928. Certain seedlings have been discarded on account of undesirable characters.

The following table shows the number of seedlings of each cross and their stage of maturity:—

| Cross. | Planted out. | In Pots. | In Seed-bed. | Total. |
|---|---|---|---|---|
| Gros Michel X Robusta | 12 | .. | 1 | 13 |
| Rubra X Robusta | 9 | .. | 2 | 11 |
| Ramkela X Robusta | 13 | .. | 18 | 31 |
| Whitehouse X Robusta | 7 | .. | 10 | 17 |
| Honey X Robusta | 1 | .. | .. | 1 |
| Whitehouse X Gros Michel | 1 | .. | .. | 1 |
| Ramkela X Gros Michel | 1 | .. | .. | 1 |
| Rubra X Gros Michel | 1 | .. | .. | 1 |
| Rubra X Kewensis | 6 | .. | .. | 6 |
| Whitehouse X Kewensis | 12 | .. | 7 | 19 |
| Ramkela X Kewensis | 8 | 3 | 2 | 13 |
| Totals | 71 | 3 | 40 | 114 |

A piece of heavily contaminated land at the Laboratory has been planted out with the parent varieties, interplanted with Gros Michel, to test definitely their resistance to Panama Disease. So far, the results of this test have shown that the 'Glengoffe' variation of Gros Michel and the local upland variety 'Otaheite' are both highly susceptible although previously thought to be resistant.

A small consignment of suckers of 'Lacatan,' a variety highly resistant to Panama Disease, was imported from the Imperial College, Trinidad, in May. These have been planted at the Laboratory side by side with the Robusta, Bumelan and Giant Fig to find the differences, if any, between these forms.

Every effort is being made to obtain further crosses likely to produce seedlings both resistant to Panama Disease and yet suitable for carrying to overseas markets. All parents have therefore been eliminated which have seed-bearing qualities and other characters which are undesirable.

Pollenation work commenced at the hill station in the autumn, under Mr. Sutherland's supervision, but unfortunately several of these bunches were lost in autumnal storms.

It is hoped that several of the more advanced hybrid plants will be tested for disease resistance during 1928. The land at the Laboratory which can be used for this purpose is very limited, and in view of its unsuitability to bananas, a more favourable spot should become a necessity when the experiments have progressed further.

F. E. V. Smith,
Government Microbiologist.

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*Report of the Government Entomologist.*

The most important pests during the period under review were:

### Banana.

The Banana Borer, *Cosmopolites sordidus*, Germ.—This insect was discovered in one new locality. Experiments with Seekay (a crude form of Paradichlorobenzene) were continued. In one case the experiments were abandoned owing to the land having become water-soaked. A large series of experiments were carried out on a property where an attempt was being made to re-establish bananas in a badly infested area, resulting in a 75 to 85% effectiveness.

Another fact worth recording in connection with this insect is that a new host-plant of this weevil has been found, namely, cocoe (*Xanthosoma sagittifolium*). This fact could be put to practical use, since cocoes could be utilized as a "trap crop;" but, it has been decided, and wisely so, to discourage the planting of such crops amongst bananas owing to the danger of disseminating Panama Disease.

### Citrus.

With the recent awakening of interest in these fruits more attention is being devoted to the resuscitation of old groves and the planting of new groves, so that many requests were received for information regarding Citrus pests.

*Scale Insects.*—The most destructive species are the Purple Scale, *Lepidosaphes beckii*, (*Newm.*), the Snow Scale, *Pinnaspis* [*Hemichionaspis*] *minor*, (Mask.), the Florida Red Scale, *Chrysomphalus aonidum*, (L.), and the Articulated Scale, *Selenaspidus articulatus*, (Morg.). Fumigation is unquestionably the best method of controlling these insects and is the method relied on in most Citrus-growing countries; but, at this time at any rate, it is futile to hope that our growers would adopt this method owing to the initial outlay and the low price of the fruit, so experiments have been carried out with a view to finding a more effective spray mixture than the more well-known contact insecticides and I have found that Sunoco is most effective, resulting in a 98 to 99% kill in the case of the Snow Scale and the Florida Red Scale, the latter being very prevalent on young plants of the Pine-apple variety of orange and retards their growth to a serious degree. Fumigation experiments with Cyanogas against the Purple Scale on two to three year old orange trees resulted in a 99.2% kill.

The Citrus Black Fly, *Aleurocanthus woglumi*, Ash.—More attention is being given to artificial control measures against this pest in those localities in which entomogenous fungi do not flourish.

The Orange Dog, *Papilio thoas melonius*, (Cram.).—One serious outbreak of the larvae of this species occurred during the year on young orange and grapefruit plants.

Citrus Root-Weevils, *Pachnaeus* spp. and *Prepodes* spp.—In several cases it was found necessary to adopt artificial control measures against both the larvae and adults of these species and in the case of the larvae Seekay proved a very effective soil-fumigant.

### Corn.

The only pest of this crop which has required attention during the year was the cosmopolitan Corn Earworm, *Chloridea obsoleta*, (F.).

### Coffee.

The only pest of any importance was the Coffee Leaf Miner, *Leucoptera coffeella*, Staint.

### Mango.

The Mango Fruit Fly, *Anastrepha fraterculus*, Wied.—An appreciable loss of last year's crop of Bombay mangoes was due to this fly. The loss, however, was considerably less than that experienced during the preceding two years when the fallen infected fruit were allowed to remain under the trees and when guavas and plums were allowed to function as breeding places.

### Pimento.

The Pimento White Fly, *Aleurodicus pimentae*, Lg.—This species is comparatively new and is only known to occur in Jamaica, having been discovered about three years ago by the writer. A serious outbreak occurred during the year in Manchester. From what I have been able to gather this is not the first heavy infestation, similar infestations having occurred in Manchester and St. Ann several years ago.

Briefly, its life-history is: The eggs are laid on the undersurface of the leaf in the form of a hollow circle or semi-circle, the number of eggs varying from 350 to 750, and the incubation period ranges from six to nine days. The duration of the larval stage varies from twenty-two to thirty-six days, of which the first instar accounts for from six to ten days, the second instar from eight to twelve days and the third instar from eight to fourteen days. The duration of the pupal stage varies from fifteen to twenty-five days. A large quantity of honey-dew is secreted during the larval and pupal stages. Both sexual and parthogenitic reproduction takes place. In addition to pimento, the host-plants are rose apple, otaheite apple and Citrus. Its natural enemies include the larvae of the Lace-Wing Fly, *Chrysopa thoracica*, Walk., the larvae of a microlepidopteron and the "lady-beetle," *Lioscymnus diversipes*, Champ.

The Twig-Girdler, *Psiloptera torquata*, (Dalm), var. *jamaicensis*, Fish.—In one locality this beetle was reported to have caused considerable damage.

### Sugar Cane.

The West Indian Cane Fly, *Stenocranus sacchivorus*, (Westw.)—In certain districts this insect must be regarded as the most important pest of this crop, especially during the months of December to March, during which owing to the lack of humidity the entomogenous fungus, *Fusarium* sp., does not function. It is remarkable with what avidity this insect attacks some varieties of sugar cane, notably White Transparent and BH 10 (12), seriously retarding their growth, if not killing them, whereas other varieties, such as Badilla, Uba and 11569, are but slightly attacked and no retardation of growth results, even though the favourite varieties and the less favoured varieties be intermixed.

The defoliators, *Cirphis latiuscula*, H.-Sch., *C. humidicola*, Guen., the Fall Army Worm, *Laphygma frugiperda*, Sm., & Abb., and the Looper Cutworms, *Mocis disseverans*, (Walk.), and *M. repanda*, (F.) were again this year very scarce, indeed neglible in comparison with their activities three years ago.

The Yellow Sugar Cane Aphid, *Sipha flava*, Forbes.—Infestations by this species occurred in a few localities on the older ratoons and plant-canes.

The "White Ant," *Leucotermes ripperttii*, (Ramb.)—One very serious attack on ratoon canes was reported.

### Sweet Potato.

The Sweet Potato Bug, *Corecoris fuscus*, (Thumb.)—Several serious attacks by this bug occurred throughout the Island practically throughout the year. Dusting with Cyanogas proved the most effective control method.

The Sweet Potato Weevil, *Cylas formicarius*, (F.) *elegantulus*, Pierce.—Damage by this weevil was reported from several districts. It is noteworthy that it also attacked sweet cassava grown as a rotation crop on land which had recently grown a crop of sweet potatoes.

### Mosaic Disease.

I succeeded in transmitting this disease from maize to maize by means of the Corn Leafhopper, *Peregrinus maidis*, Ashm., but failed to transmit the disease by the same species from maize to sugar cane or from sugar cane to sugar cane, though sugar cane is also a host-plant of that insect.

### Insect Collection.

Additions were made to the Collection, some of which proved to be new and in most cases the type specimens were deposited in the British Museum (Natural History).

I desire to acknowledge the great assistance rendered me by the Director of the Imperial Bureau of Entomology.

### Lectures.

Five lectures were delivered on the Banana Borer and the Citrus Black Fly, and five lectures on Sanitary Entomology to Sanitary Inspectors.

### Publications.

Bulletin 4, Part 3—Catalogus Insectorum Jamaicensis (About to be issued).
Bulletin 5—Insecticides and Fungicides.

C. C. Gowdey, B.Sc., F.E.S.,
Government Entomologist.

## VI.—AGRICULTURAL EDUCATION.

*Report of Headmaster, Government Farm School.*

*Students.*—The School was full the whole year as we had 42 Students in residence for the three terms.

The following Students completed the course of three years:—C. V. Atkinson, R. A. Amiel, V. B. Roche, C. A. Boyd, B. R. Carnegie, J. S. Waugh, J. G. Witter, C. N. Burke, H. Carroll, H. J. Codner, A. C. Black, W. N. Ritchie. It is pleasing to record that 7 of these Students had obtained positions by the end of December.

*Buildings and Equipment.*—The buildings and equipment of the School were improved by the installation of electric light, the building of a new dormitory to accommodate 12 additional Students, a recreation room, a new work-shop and a new class room. These additions will be of great value to the Students.

*General.*—The demand for reservations in the School continues to be good as we had 52 applications for 24 vacancies.

The usual work was carried out by the Students in the Experiment Station and in the various activities of the Stock Farm.

ROY S. MARTINEZ,
Headmaster.

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*Report of Medical Officer.*

I have the honour to report that, during the year ending December 31st, 1927, the general health of the Students of the Hope Farm School has been excellent.

The Students, attendants and servants were inoculated against Enteric Fever and vaccinated against small-pox.

The Sanitary conditions are good.

LEWIS A. CROOKS,
M.B. C.M. (Edin.)

## VII.—LIVESTOCK.

### A.—GOVERNMENT STUD FARM, GROVE PLACE, MANCHESTER.

*Live Stock, Grove Place Pen, 1927.*

| | |
|---|---|
| | 1 Zebu Jersey Bull |
| | 1 Aber-Angus Bull |
| | 1 Hereford Bull |
| | 2 Grade Montgomery Bulls |
| 14 | 9 Bull Calves of 1926 and 1927 |
| 84 | 84 Native Dairy Cows |
| | 3 Pedigree Cows |
| 10 | 7 Pedigree Heifers |
| | 5 Grade Native Heifers |
| | 7 Grade Ayrshire Heifers |
| | 11 Grade Guernsey Heifers |
| | 5 Grade Hissar Heifers |
| | 18 Grade Jersey Heifers |
| | 1 Grade Montgomery Heifer |
| 48 | 1 Grade Swiss Heifer |
| 28 | 28 Steers |
| 184 | |

*Horsekind.—*

| |
|---|
| 1 Imported Horse " Lembach" |
| 1 Imported Prooff Ass, " Kentucky Boy." |
| 12 Brood Mares |
| 4 Fillies |
| 1 Colt |
| 1 Gelding |
| 13 Mules |
| 2 Donkeys |
| 35 Head |

The following is the Summary of the Valuation of the Live Stock at Grove Place on December 31, 1927:—

| | £ | s. | d. |
|---|---|---|---|
| Cattle .. .. .. | 1,443 | 10 | 0 |
| Horsekind .. .. | 748 | 0 | 0 |
| Total Pen Stock | 2,191 | 10 | 0 |
| Beef Cattle .. .. | 420 | 0 | 0 |

SERVICES OF BULLS AT GROVE PLACE, JANUARY. 1ST TO DECEMBER 31ST, 1927.

| No. | Bulls. | Visiting Cows. | Farm Cows. | Total. |
|---|---|---|---|---|
| 1. | Brown Swiss "Trumpeter" .. | 1 | 29 | 30 |
| 2. | Jersey "Hon. Mr. Polo" .. .. | 11 | 19 | 30 |
| 3. | Red Poll "Pilot" .. .. | 7 | 16 | 23 |
| 4. | Ayrshire "Cyril" .. .. | 3 | 2 | 5 |
| 5. | Ayrshire "Food Controller" .. | 2 | 8 | 10 |
| 6. | Grade Montgomery "Cortes" .. | 16 | 20 | 36 |
| 7. | Grade Montgomery "Monty" .. | .. | 4 | 4 |
| 8. | Aberdeen "Angus Eturian" .. | 19 | 1 | 20 |
| 9. | Devon "Highfield Nobleman" .. | 7 | 3 | 10 |
| 10. | Ayrshire "Rubicon" ... .. | .. | 1 | 1 |
| | | 66 | 103 | 169 |

B.—GOVERNMENT STOCK FARM, HOPE.

*Live Stock, Hope Stock Farm,* 1927.

PEDIGREE STOCK.

| | | | |
|---|---|---|---|
| *Red Polls*— | | | |
| Imported Red Poll Bull .. .. | 1 | | |
| Native Red Poll Bull ... .. | 1 | | |
| Imported Red Poll Cows .. .. | 2 | | |
| Native Red Poll Cows and Heifers .. | 30 | 34 | |
| *Jerseys*— | | | |
| Imported Jersey Bull .. .. | 1 | | |
| Native Jersey .. .. | 2 | | |
| Imported Jersey Cow .. .. | 1 | | |
| Native Jersey Cows and Heifers .. | 22 | 26 | |
| *Guernseys*— | | | |
| Native Guernsey Cows and Heifers .. | 4 | 4 | |
| *Ayrshires*— | | | |
| Native Ayrshire Bull .. .. | 1 | | |
| Imported Ayrshire Cows .. .. | 2 | | |
| Native Ayrshire Cows .. .. | 3 | 6 | |
| *Brown Swiss*— | | | |
| Native Brown Swiss Cows .. | 5 | 5 | |
| *Montgomery*— | | | |
| Imported Montgomery Bull .. | 1 | 1 | |
| *Nellore*— | | | |
| Imported Nellore Bull .. .. | 1 | | |
| Imported Nellore Cows .. .. | 3 | | |
| Native Nellore Bulls .. .. | 2 | | |
| Native Nellore Heifers .. .. | 5 | 11 | |
| Total Pedigree Stock | | 87 | |

GRADED STOCK.

| | | |
|---|---|---|
| *Bulls*— | | |
| Grade Montgomery Bulls .. | 4 | |
| Grade Guernsey Bulls ... .. | 4 | 8 |
| *Cows*— | | |
| Dairy Cows .. .. | 84 | |
| Foster Mothers .. .. | 9 | 93 |
| *Heifers*— | | |
| Grade Native Heifers ... ... | 5 | |
| Grade Angus Heifer .. ... | 1 | |
| Grade Ayrshire Heifers .. ... | 6 | |
| Grade Guernsey Heifers ... ... | 40 | |
| Grade Jersey Heifers ... ... | 37 | |
| Grade Montgomery Heifers ... | 12 | |
| Grade Nellore Heifer ... ... | 1 | |
| Grade Swiss Heifer . ... | 1 | 103 |
| *Steers*— | | |
| Plough Steers ... ... | 12 | 12 |
| Total Graded Stock ... | | 216 |
| Grand Total ... ... | | 303 |

*Horsekind—*

17 17 Mules

*Poultry—*

1 Pen Rhode Island Reds.

*Bees—*

Nil.

WEEKLY ANALYSIS OF MILK SUPPLIED TO THE PUBLIC HOSPITAL AND LUNATIC ASYLUM BY THE STOCK FARM, 1927.

| Quarter ending | Solids. | Fat. | Sp. Gravity. | Solids. |
|---|---|---|---|---|
| March 31, 1927 .. | 13.33 | 4.48 | 1.0313 | 8.85 |
| June 30, 1927 .. | 13.79 | 4.70 | 1.0321 | 9.09 |
| September 30, 1927 .. | 13.65 | 4.82 | 1.0305 | 8.83 |
| December 31, 1927 .. | 13.50 | 4.77 | 1.0305 | 8.73 |
| | 13.57 | 4.69 | 1.0311 | 8.88 |

The following is a Summary of the Valuation of the Live Stock at the Farm in December, 1927:

| | | |
|---|---|---|
| Cattle .. .. | £8,003 | 10 0 |
| Horsekind .. .. | 336 | 0 0 |
| Poultry .. .. | 39 | 0 0 |
| Total .. .. | £8,378 | 10 0 |

MILK YIELD, DAIRY HERD, 1923, 1924, 1925, 1926, 1927.

*Imperial Quarts per diem.*

| Month. | 1923. | 1924. | 1925. | 1926. | 1927. |
|---|---|---|---|---|---|
| January .. | 348.4 | 264.4 | 304.9 | 401.0 | 433.7 |
| February .. | 347.2 | 238.2 | 324.0 | 386.3 | 392.0 |
| March .. | 307.6 | 249.3 | 369.3 | 414.4 | 407.4 |
| April .. | 248.9 | 224.2 | 441.9 | 435.8 | 459.2 |
| May .. | 318.7 | 271.4 | 513.7 | 453.2 | 503.1 |
| June .. | 369.3 | 337.8 | 504.1 | 485.2 | 444.4 |
| July .. | 324.6 | 376.1 | 457.9 | 511.4 | 476.1 |
| August .. | 303.0 | 356.0 | 464.0 | 567.6 | 489.4 |
| September | 320.6 | 365.6 | 438.4 | 519.2 | 456.2 |
| October .. | 270.3 | 370.4 | 432.9 | 526.8 | 396.9 |
| November .. | 286.8 | 326.3 | 393.1 | 492.1 | 424.6 |
| December .. | 288.5 | 314.6 | 396.7 | 473.3 | 429.7 |
| | 314.2 | 307.9 | 420.1 | 472.2 | 442.7 |

RECORD OF DAIRY HERD MILK YIELD, 1927.

| Month. | Av. No. of Cows. | Total Qts. per mensem. | Av. per Cow qts. |
|---|---|---|---|
| January .. | 91 | 13,443.7 | 4.8 |
| February .. | 75 | 10,977.0 | 5.2 |
| March .. | 72 | 12,630.0 | 5.6 |
| April .. | 76 | 13,776.9 | 6.0 |
| May .. | 75 | 15,597.6 | 6.7 |
| June .. | 73 | 13,332.7 | 6.1 |
| July .. | 79 | 14,758.5 | 6.0 |
| August .. | 79 | 15,171.0 | 6.2 |
| September .. | 75 | 13,687.3 | 6.1 |
| October .. | 69 | 12,303.0 | 5.7 |
| November .. | 79 | 12,738.5 | 5.4 |
| December .. | 85 | 13,321.0 | 5.1 |
| | 77 | 13,478.1 | 5.7 |

## Milk Yield, 1927, Hope Dairy Herd.

| No. | Name of Cow. | Breed. | Age in years. | Average content Milk fat. | Yield in lbs. | Milking Weight. Lbs. | Max. yield. Imp. Qts. | Sale Value at 8d. per Qrt. £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Kara 1st | Grade Holstein | 7 | 3.8 | 10,642 | 1,052 | 24.0 | 136 | 18 | 6 |
| 2 | Rosette 2nd | Grade Guernsey | 9 | 4.2 | 8,702 | 1,000 | 18.0 | 111 | 19 | 1 |
| 3 | Dodo 1st | Grade Holstein | 8 | 4.4 | 8,000 | 1,206 | 21.6 | 102 | 18 | 6 |
| 4 | Cognac 2nd | " | 5 | 5.2 | 6,525 | 950 | 17.2 | 83 | 19 | 2 |
| 5 | Desiree 3rd | Red Poll | 6 | 4.4 | 6,492 | 1,043 | 16.4 | 83 | 10 | 8 |
| 6 | Norbrook 2nd | Grade Holstein | 8 | 3.5 | 6,238 | 1,080 | 19.6 | 80 | 5 | 3 |
| 7 | Hope Flighty | Red Poll | 9 | 3.7 | 6,230 | 1,014 | 13.4 | 80 | 3 | 0 |
| 8 | Polka | " | 6 | 4.5 | 6,166 | 980 | 18.2 | 79 | 6 | 9 |
| 9 | Hope Brisk 1st | " | 8 | 3.9 | 5,824 | 1,076 | 13.6 | 74 | 18 | 10 |
| 10 | Blossom 1st | Grade Zebu Jersey | 9 | 5.7 | 5,769 | 990 | 13.8 | 74 | 4 | 5 |
| 11 | Pet 1st | " | 8 | 4.6 | 5,769 | 1,024 | 17.7 | 74 | 4 | 5 |
| 12 | Norbrook 3rd | Grade Holstein | 3 | 3.3 | 5,749 | 980 | 11.3 | 73 | 19 | 1 |
| 13 | Portia | Jersey | 5 | 4.0 | 5,630 | 880 | 17.6 | 72 | 7 | 9 |
| 14 | Lydite 3rd | Grade Holstein | 5 | 4.0 | 5,581 | 1,032 | 15.9 | 71 | 16 | 7 |
| 15 | Shrew 13th | Grade Guernsey | 5 | 4.2 | 5,541 | 846 | 10.3 | 71 | 5 | 9 |
| 16 | Hope Beta 5th | Red Poll | 5 | 3.7 | 5,398 | 922 | 13.5 | 69 | 9 | 0 |
| 17 | Tilda 4th | Grade Montgomery | 5 | 4.6 | 5,392 | 1,124 | 11.9 | 69 | 7 | 4 |
| 18 | Beetroot | Holstein-Red Poll | 8 | 4.1 | 5,300 | 895 | 16.5 | 68 | 3 | 7 |
| 19 | Monica 3rd | Grade Zebu Jersey | 10 | 4.8 | 5,229 | 930 | 13.4 | 67 | 5 | 5 |
| 20 | Hope Beta 3rd | Red Poll | 7 | 4.7 | 5,226 | 910 | 13.1 | 67 | 4 | 3 |
| 21 | Pigeon 2nd | Grade Brown Swiss | 6 | 4.4 | 5,224 | 989 | 11.3 | 67 | 4 | 1 |
| 22 | Ellenstine 2nd | Zebu-Jersey | 10 | 4.2 | 5,123 | 850 | 12.7 | 65 | 18 | 6 |
| 23 | Baby 1st | Grade Jersey | 9 | 5.0 | 5,108 | 820 | 13.9 | 65 | 14 | 3 |
| 24 | Buz | Holstein-Red Poll | 8 | 3.9 | 5,090 | 906 | 14.1 | 65 | 9 | 10 |
| 25 | Violet 2nd | Grade Jersey | 10 | 3.5 | 5,040 | 982 | 8.9 | 64 | 16 | 8 |
| 26 | Sayda | Jersey | 4 | 4.8 | 4,981 | 894 | 16.5 | 64 | 1 | 9 |
| 27 | Vickie, C. | Grade Montgomery | 4 | 4.7 | 4,972 | 900 | 10.8 | 63 | 19 | 4 |
| 28 | Perfect | Jersey | 4 | 4.8 | 4,934 | 800 | 14.7 | 63 | 9 | 6 |
| 29 | Badge 2nd | Zebu-Jersey | 9 | 5.0 | 4,865 | 926 | 12.6 | 62 | 12 | 0 |
| 30 | May 4th | Grade Jersey | 5 | 4.7 | 4,745 | 825 | 10.4 | 61 | 1 | 0 |
| 31 | Monica 7th | Grade Guernsey | 5 | 3.7 | 4,613 | 970 | 12.7 | 59 | 7 | 10 |
| 32 | Mystery | Grade Jersey | 6 | 3.8 | 4,604 | 877 | 13.8 | 59 | 4 | 9 |
| 33 | Monica 6th | Grade Brown Swiss | 6 | 4.3 | 4,558 | 1,112 | 12.2 | 58 | 13 | 0 |
| 34 | Diva 2nd | Grade Zebu Jersey | 12 | 4.9 | 4,543 | 1,008 | 11.9 | 58 | 9 | 3 |
| 35 | Truth 4th | Grade Zebu Jersey | 5 | 4.7 | 4,523 | 994 | 15.7 | 58 | 3 | 8 |
| 36 | Bunny 3rd | Grade Holstein | 5 | 4.2 | 4,476 | 1,060 | 10.9 | 57 | 11 | 10 |
| 37 | Lizzie 3rd | Grade Jersey | 4 | 5.3 | 4,471 | 880 | 8.7 | 57 | 10 | 5 |
| 38 | Quail 2nd | Zebu Jersey | 10 | 4.4 | 4,440 | 880 | 10.4 | 57 | 3 | 2 |
| 39 | Pogistine | Jersey | 4 | 4.0 | 4,438 | 744 | 13.5 | 57 | 2 | 1 |
| 40 | Diva 4th | Grade Zebu Jersey | 10 | 4.2 | 4,410 | 1,004 | 11.6 | 56 | 14 | 11 |
| 41 | Quail 4th | Grade Brown Swiss | 6 | 4.3 | 4,405 | 972 | 9.1 | 56 | 13 | 4 |
| 42 | Bess 1st | Grade Guernsey | 7 | 4.0 | 4,377 | 1,000 | 12.0 | 56 | 6 | 7 |
| 43 | Angel 11th | Grade Holstein | 5 | 3.9 | 4,370 | 920 | 11.6 | 56 | 4 | 8 |
| 44 | Monica 12th | Grade Guernsey | 7 | 4.0 | 4,361 | 918 | 11.9 | 56 | 2 | 1 |
| 45 | Diva 6th | " | 6 | 5.1 | 4,275 | 648 | 7.4 | 55 | 0 | 1 |
| 46 | Diva 22nd | " | 5 | 4.3 | 4,249 | 684 | 8.8 | 54 | 13 | 4 |
| 47 | Diva 7th | " | 6 | 4.6 | 4,211 | 820 | 10.4 | 54 | 4 | 2 |
| 48 | Dolly 1st | Grade Brown Swiss | 6 | 5.5 | 4,188 | 1,104 | 10.6 | 53 | 17 | 6 |
| 49 | Baby 2nd | Grade Montgomery | 4 | 5.6 | 4,169 | 1,000 | 8.1 | 53 | 12 | 6 |
| 50 | Sola 9th | Grade Jersey | 5 | 4.6 | 4,097 | 890 | 14.5 | 52 | 13 | 11 |
| 51 | Pussy | Grade Red Poll | 12 | 4.5 | 4,084 | 956 | 9.9 | 52 | 10 | 10 |
| 52 | Lydite 13th | Grade Holstein | 5 | 4.1 | 4,036 | 992 | 13.0 | 51 | 18 | 6 |
| 53 | Perfume | Jersey | 4 | 4.4 | 4,029 | 814 | 13.0 | 51 | 16 | 3 |
| 54 | Panama's Pretty | Red Poll | 8 | 3.8 | 3,970 | 1,186 | 11.0 | 51 | 2 | 8 |
| 55 | Dodo 3rd | Grade Holstein | 4 | 3.5 | 3,907 | 1,142 | 14.2 | 50 | 4 | 10 |
| 56 | Hector's Gem | Jersey | 8 | 4.8 | 3,809 | 760 | 6.5 | 48 | 19 | 11 |
| 57 | May 3rd | Grade Guernsey | 6 | 4.4 | 3,764 | 1,094 | 14.7 | 48 | 8 | 3 |
| 58 | Mirage 1st | " | 7 | 4.2 | 3,587 | 850 | 6.1 | 46 | 3 | 1 |
| 59 | Pansy 2nd | Jersey | 3 | 4.9 | 3,517 | 780 | 9.7 | 45 | 4 | 11 |
| 60 | Dodo 2nd | Grade Holstein | 7 | 3.8 | 3,492 | 898 | 6.9 | 44 | 16 | 5 |
| 61 | Hope Flighty 1st | Red Poll | 4 | 6.2 | 3,383 | 912 | 13.0 | 43 | 10 | 8 |
| 62 | Rosette 8th | Grade Jersey | 4 | 4.1 | 3,371 | 826 | 11.9 | 43 | 7 | 6 |
| 63 | Monica 8th | Grade Brown Swiss | 4 | 4.0 | 3,355 | 840 | 10.4 | 43 | 3 | 3 |
| 64 | Panama's Betty | Red Poll | 5 | 3.3 | 3,295 | 998 | 11.7 | 42 | 7 | 11 |
| 65 | Meadow | Grade Montgomery | 4 | 4.7 | 3,277 | 925 | 7.7 | 42 | 3 | 1 |
| 66 | Polka Dot | Red Poll | 9 | 4.3 | 3,276 | 1,130 | 8.0 | 42 | 3 | 0 |
| 67 | Bunny 2nd | Grade Zebu Jersey | 7 | 4.3 | 3,261 | 940 | 8.3 | 41 | 19 | 1 |
| 68 | Etta of Hope | Jersey | 7 | 4.7 | 3,187 | 758 | 4.7 | 40 | 19 | 11 |

## VIII.—GOVERNMENT LABORATORY.

*Report of the Deputy Island Chemist.*

The total number of samples analysed during the year ended 31st December, 1927, was 2,407, being an increase of 351 over the number for last year.

The samples are classified as follows:—

"A" Official.

| | |
|---|---|
| (I) *Police*— | |
| Human viscera and organs | 49 |
| Substances for poison | 60 |
| Coins, genuine | 50 |
| Coins, counterfeit | 117 |
| Counterfeiting Exhibits | 85 |
| Medicines and Drugs | 19 |
| Arson Exhibits | 14 |
| Miscellaneous | 4 |
| *Under the Adulteration of Food and Drugs Law.* | |
| Fresh Milks, genuine | 2 |
| adulterated | 4 |
| Whisky, genuine | 2 |
| adulterated | 2 |
| Wines, adulterated | 5 |
| *Under the Spirit License Law.* | |
| Rums | 8 |
| *Under the Petroleum Law.* | |
| Kerosines | 1 |
| Gasolines | 7 |
| *Under the Drugs and Poisons Law.* | |
| Oil of Peppermint | 2 |
| *Under the Dangerous Drugs Law.* | |
| Opium | 4 |
| Ganga | 290 |
| *Under the Agricultural Produce Law.* | |
| Annatto | 18 |
| Pimento | 136 |
| Total | 879 |
| (II) *Customs*— | |
| Native and other wines | 87 |
| Rect. Spirits and Absolute Alcohols | 17 |
| Industrial Alcohols | 17 |
| Rums | 10 |
| Drugs and Medicines | 12 |
| Gasolines | 12 |
| Fuel Oils | 36 |
| Spirituous Compounds | 8 |
| Disinfectants and Insecticides | 4 |
| Condensed Milks | 3 |
| Miscellaneous | 8 |
| Total | 214 |
| (III) *Department of Science and Agriculture*— | |
| Animal viscera | 7 |
| Fertilizers | 11 |
| Dyestuffs | 4 |
| Instruments for test | 4 |
| Miscellaneous | 4 |
| Total | 30 |

| | | |
|---|---|---|
| (IV) *Medical Department*— | | |
| Waters | | 31 |
| Drugs and Chemicals | | 2 |
| Foodstuffs | | 6 |
| Vomits | | 2 |
| | Total | 41 |
| (V) *Medical Officers of Health*— (Kingston and St. Andrew Corporation). | | |
| Fresh Milks, genuine | | 33 |
| adulterated | | 7 |
| Pimento | | 1 |
| | Total | 41 |
| (VI) *Department of Public Works*— | | |
| Waters, irrigation | | 125 |
| potable | | 1 |
| Minerals and Ores | | 12 |
| Gasolines | | 1 |
| | Total | 139 |
| (VII) *Prisons Department*— | | |
| Foodstuffs | | 3 |
| | Total | 3 |
| (VIII) *Jamaica Agricultural Society*— | | |
| Samples of Silk | | 9 |
| Cocoas | | 4 |
| Guinea Corn | | 1 |
| | Total | 14 |
| | Total Official | 1,361 |

"B" AGRICULTURAL.

| | |
|---|---|
| Soils and Sub-soils | 45 |
| Agricultural Limes and Marls | 7 |
| Artificial Manures and Fertilizers | 7 |
| Cane Juices | 6 |
| Distillery Products | 2 |
| Total | 67 |

"C" GENERAL.

| | |
|---|---|
| Stock Farm Milks | 605 |
| Cattle Dips | 33 |
| Rums | 129 |
| Sugars | 103 |
| Fresh Milks | 16 |
| Butters | 6 |
| Steam Coals | 6 |
| Animal Viscera | 6 |
| Substances for Poison | 6 |
| Waters, Potable | 7 |
| Irrigation | 6 |
| Mineral | 3 |
| Minerals and Ores | 8 |
| Condensed Milks | 2 |
| Wines | 4 |
| Paints | 4 |
| Oils, Edible and Essential | 7 |
| " Mineral | 3 |
| Miscellaneous | 25 |
| | 979 |
| Grand Total | 2,407 |

## Official Samples.

The 49 analyses of human viscera were made in connection with 23 deaths. In 13 cases poison was found and determined in the viscera as follows:—

(1) 0.05 grains Yellow Phosphorus from the organs of a male adult.
(2) 0.02 grains Yellow Phosphorus from the organs of a male adult.
(3) 45 grains of Oxalic Acid from the stomach of a male adult who was an officer on the S.S. "Orca."
(4) 0.03 grains of Arsenic in the viscera of Daniel Russell who was murdered by poisoning with Arsenite of Soda administered in coffee.
(5) 1/500 of a grain of Yellow Phosphorus in the viscera of a Chinese woman.
(6) Large traces of Urechitoxin in the exhumed body of a female child.
(7) 0.25 grains Arsenic in the viscera of a male child.
(8) 0.23 grains Arsenic in the viscera of a male adult.
(9) 0.11 grains Arsenic in the viscera of a male adult.
(10) Large traces of Ptomaines in the stomach of a male child who died after eating fish picked up on the sea shore.
(11) Large traces of Yellow Phosphorus in the organs of a male adult.
(12) Urechitoxin in the viscera of a male child.
(13) Urechitoxin in the viscera of a female child.

The substances examined for poison which gave positive results were as follows:—

(1) Three liquids containing a preparation of Guaiacum leaves and bush in connection with an attempt to procure abortion.
(2) ½ oz. powdered glass in porridge.
(3) 60 grains Caffeine in the stomach of a race horse.
(4) Asafœtida in a sample of rum.
(5) 14.5 grains Arsenic (Arsenite of Soda) in Coffee.
(6) Large traces of Arsenic in two vomits.
(7) 3 grains of Lead Acetate in a sample of water.
(8) Copper Sulphate in milk.
(9) Arsenic in cooked food and water.
(10) 5 grains Corrosive Sublimate in sugar.
(11) 4¼ grains Arsenious Oxide in water.
(12) Arsenite of Soda in an old metal drum.
(13) 0.6 grains Yellow Phosphorus in water.
(14) 12 grains powdered glass in cooked food.
(15) Arsenic and Yellow Phosphorus in milk.
(16) 1/100 grain Yellow Phosphorus in tea.
(17) 0.9 grains Arsenic (Cooper's Dip) in wine.

139 Certificates were issued to the Police for use in prosecutions, under the Island Chemist's Certificate Laws of 1902 and 1916, which is an increase of 48 over last year.

The total number of Police samples analysed, viz., 879, is an increase of 352 over the number analysed in 1926. One case of suspected poisoning revealed the fact that a large amount of Epsom Salts had been added to cooked food by a boy who had been dismissed by his employer.

The great increase in the number of Ganga samples submitted is due to the vigilance of the Police in connection with the Dangerous Drugs Law, the number submitted being 290 as compared with 100 for last year. An improved chemical method for the detection of traces of ganga and its preparations has been devised by the Deputy Island Chemist and used with success in expediting reports on samples of this pernicious drug which may be brought from distant parts of the Island by the Police. It has been of use in detecting ganga in mixtures of ganga and tobacco, and also in determining whether a pipe has been used in ganga smoking.

The number of coins and counterfeit coins examined is about the same as last year, whilst counterfeiting exhibits number 85 as against 77.

Medicines and Drugs, analyses in connection with prosecutions under the Medical Law, number 19 and included such substances as powdered Senna, Rhubarb, Cascara, alcoholic extracts of Kola Nuts, besides a volatile perfume found to be Ethyl Chloride with traces of Methyl Salicylate.

The 14 Arson exhibits included various containers with charred cloth, straw, paper, and water, which were analysed for petroleum and other inflammable liquids.

Out of 15 samples submitted by the Police under the Food and Drugs Law, 11 were found to be adulterated, which is a surprisingly high proportion.

154 samples of Pimento and Annatto were submitted in connection with the Agricultural Produce Law. The wreck of the "Sea Serpent" on which a large amount of Pimento suffered damage by sea water, was responsible for the large number of pimento samples. Analysis of annatto revealed the fact that attempts are occasionally made to restore the colour of old annatto by refacing it with red earth.

The Customs samples numbered 214, being an increase of 39 over the number for the year 1926. They consisted chiefly of Native Wines for drawback and various alcoholic preparations for strength for the purpose of assessing duty payable. Assistance was given in analysing rums in connection with a case of larceny of rum from a factory to establish original strength. The question of denaturing alcohol for conversion into Motor Spirit was investigated and recommendations for standard denaturants were made accordingly to the Director of Agriculture.

Thirty samples were analysed for the Department of Science and Agriculture, comprising chiefly fertilizers and animal viscera for poison.

The Medical Department submitted 41 samples of which 31 were waters. The waters supplied to Kingston and St. Andrew were sampled and analysed quarterly. Some assistance was given to the Corporation concerning the question of sediment in the water mains about which complaints were made from certain areas in Kingston. The other 10 samples included foodstuffs, drugs and chemicals, and vomits.

Out of 40 samples of milk submitted by the Medical Officers of Health for Kingston and St. Andrew 7 were found to be adulterated by addition of water. A sample of so-called "cooking butter" was analysed and found to be an inferior grade of margarine wholly devoid of any butter and containing an excessive amount of water. Recommendations have been made for the adoption of a legal standard for butter and margarine.

For the Department of Public Works 139 samples were analysed. These consisted chiefly of waters and minerals in connection with the investigations concerning irrigation by the Irrigation Adviser.

Three foodstuffs were analysed for the Prisons Department in connection with investigations into complaints.

14 samples of silk, cocoa and corn were analysed on behalf of the Jamaica Agricultural Society. The silk was found to be of excellent quality and indicates that there are good prospects for the development of such an industry in the Island.

### Agricultural.

The number of samples under this head is 67 as compared with 105 for the year 1926. As usual they comprise chiefly soils and sub-soils, and fertilizers. The "Adco" process for producing artificial farmyard manure from straw, cane trash, etc., was investigated and analyses made of various preparations made with Adco.

### General.

Of the 979 general samples which were analysed, 605 were samples of milk from the Stock Farm, which is a decrease of 120 samples as compared with last year. The quality of the milk supplied by the Stock Farm to the Public Institutions is of a high standard. 33 samples of Cattle Dips were analysed in connection with re-charges for Dipping Tanks to bring them up to standard strength, and fresh supplies of ingredients, Arsenite of Soda and Paranaph, were supplied accordingly. The 129 samples of rum were chiefly of the "High Ether" variety, and is an increase of 27 samples over the number for 1926. Sugars showed a slight increase in number, being 103 as against 86 for last year. 16 fresh milks and 6 butters were submitted by Penkeepers and Dairymen.

Six samples of imported steam coal were submitted for analysis by shipping firms in Kingston.

Three out of six samples of animal viscera gave the positive results for poisons as follows:—

(1) 60 grains Caffeine in the stomach of a race horse.
(2) Arsenic in the viscera of a dog.
(3) Arsenic in the viscera of a cow.

Substances examined for poison included milk which contained Copper Sulphate, and a drinking water which contained rat poison.

The three Mineral Waters were artificial beverages which were analysed for their Saccharine content.

The Irrigation waters were examined for salt content in connection with development of certain estates for growing bananas.

Minerals and Ores numbering 8 samples were submitted for identification and valuation. They included copper ores, rock salt, iron pyrites, limonite, etc.

The 4 paints were submitted by the Military Authorities in connection with a problem concerning the prevention of corrosion of ships' bottoms.

The seven edible oils were made up of Coconut oil, Bean and Cotton Seed oils. An imported edible oil bearing a proprietary trade name was found to consist of a mixture of Pea Nut Oil with skim milk powder. A so-called edible oil submitted as an odourless vegetable oil proved to consist of nothing but refined petroleum and was entirely unsuitable for use in cooking or as an edible oil.

Amongst the miscellaneous problems investigated the following are of interest:—

A portion of lead covered telephone cable, which developed pits and holes in the lead cover and threatened to have serious results, was submitted. The cause of the corrosion was traced to segregation of traces of zinc in the lead and recommendations were made accordingly to prevent a recurrence of the trouble.

Samples of orange oil were submitted to ascertain whether they were adulterated with mineral or other oils.

Advice was asked by a Kingston firm as to the manufacture of Bay Rum with a view to producing a suitable article from locally made rum to compete with Bay Rum from other West Indian Islands. The Deputy Island Chemist prepared some samples of Bay Rum which could not be distinguished from the imported article.

Various articles, foodstuffs and fabrics alleged to have been damaged by sea water, were submitted on behalf of Insurance Companies and reports were furnished accordingly.

A certain distillery in the Island submitted samples of rum which were found to develop turbidity on dilution with water. An investigation showed that the trouble was due to the presence of the so-called "rice grain" bacteria, and advice was given, with satisfactory results, for means of preventing a recurrence of the trouble.

An unlabelled drum containing liquid alleged to be an Arsenical Cattle Dip was received and analysed and was found to consist of Solignum.

Various barks and tannin materials, chiefly Mangrove and Divi-Divi were analysed for valuation purposes.

The fumigation of imported sugar canes was carried out in the Fumigatorium at the wharf by means of Hydrocyanic Acid Gas.

Experiments were carried out in connection with the production of odourless and colourless refined coconut oil from copra. The apparatus was improvised for experimental purposes by the Deputy Island Chemist who utilised the existing Condensed Milk plant. A superheater, which was made locally by Mr. P. Armstrong according to the design of the Deputy Island Chemist, was erected close to the vacuum pan to which it was connected. Copra used in the experiments was obtained from St. Thomas and was shredded in a machine which was kindly placed at our services by Mr. L. C. Nunes at the Doncaster Soap Factory. The shredded copra was pressed in a renovated and adapted hydraulic press at the Laboratory, and an expression of 43% of oil was obtained. Filtration of the oil removed suspended and mucilaginous matter and the filtered oil was analysed. From the acid value the amount of caustic necessary to neutralise the free fatty acids was calculated. A measured amount of the oil was agitated with the calculated amount of weak caustic and allowed to separate into layers by standing. The oil was separated from the aqueous layer and was washed free from caustic, after which it was run into the vacuum pan where it was treated with superheated steam in a vacuum of 25 inches, until a withdrawn sample was satisfactory as regards odour. The refined oil was devoid of the usual characteristic flavour of coconut oil. Cooking tests showed that it could be used satisfactorily in place of lard, imported lard compounds, butter and cooking oils and fats in cooking food, without imparting any unpleasant taste or even a trace of the usual coconut flavour.

The experiments are being continued with a view to cheapening the refining process, which is by no means costly even as it is carried out at present, and also with a view to the production of both flavoured and non-flavoured oils which will not develop rancidity on keeping.

The manufacture and sale of Paranaph for use in Dipping Tanks was continued throughout the year as usual. The sale of Arsenite of Soda and other Insecticides proceeded as usual. The following table gives the nature and amount of materials issued to the public for the past three years:—

| | 1925. | 1926. | 1927. |
|---|---|---|---|
| Paranaph .. | 26,541 | 29,778 | 29,954 lbs. |
| Arsenite of Soda .. .. | 15,653 | 19,146 | 17,475 lbs. |
| Copper Sulphate .. .. | 154 | 265 | 451 lbs. |
| Carbon Bisulphide .. .. | 658 | 462 | 559 lbs. |
| Rat Poison, bulk .. .. | 234 | 263 | 396 lbs. |
| Rat Poison, 1 oz. packets .. | 189 | 200 | 272 pkts. |
| Standard Iodine Solution .. | 31,250 | 35,250 | 34,750 c.c. |
| Thymol Powders .. .. | 337 | 227 | 325 ozs. |

In addition 193 refills of Starch Solution, and 39 of Soda Bicarbonate were issued to owners of Dipping Tanks.

The receipts for Laboratory fees and Sales are shown in the following table, which gives the figures for the past three years:—

| | 1925. | 1926. | 1927. |
|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. |
| Laboratory Fees .. | 174 3 6 | 160 11 6 | 201 10 0 |
| Laboratory Sales .. | 1,030 1 6 | 1,038 0 0 | 886 7 9 |

During the year one Apprentice left the Laboratory to take a position in another Department of the Service.

Two new Apprentices were engaged early in the year, and are being trained to carry out routine work in the Laboratory.

The permanent Technical Staff, numbering four persons, remains the same as last year.

The total number of samples analysed during the year, 2,407, constitutes a record, and is indicative of the increasing demands which are made on the Chemical Department of the Government Laboratory for assistance and advice by other Government Departments in addition to the general public.

W. Leigh Barnett, M.A., B.Sc., F.I.C.
Deputy Island Chemist.

## IX.—STAFF.

During 1927 the following changes of Staff have taken place:

Mr. P. W. Murray, Superintendent of Agriculture was appointed Chief Inspector of Produce under the Agricultural Produce Law. Mr. H. G. Coote, Inspector of Plant Diseases, was appointed an Inspector of Produce.

Messrs. M. S. Allen, W. C. Castello, S. O. Coy, N. E. C. Thomson and A. G. Benjamin were appointed Inspectors of Plant Diseases.

Messrs. O. W. Harrison and L. A. Boothe were appointed Apprentices at the Government Laboratory.

Mr. A. M. Brown of the Treasury acted as Cashier for four months during the absence on leave of Mr. W. E. Watson.

Mr. J. McIntosh, Temporary Clerk, was transferred to the Education Department and was succeeded by Miss G. M. Morrison.

Mr. F. E. V. Smith, Government Microbiologist, took up his appointment in April.

Mr. C. L. Harrison, Assistant to the Superintendent, Grove Place Farm, left at the end of the year, due to retrenchment of Staff.

Mr. D. N. Brown was appointed Foreman of the Government Stock Farm, Hope, in July.

I desire to acknowledge the help and loyal co-operation of the Staff during the past year.

I have the honour to be,
Sir,
Your obedient Servant,
H. H. Cousins,
**Director of Agriculture.**